Nov/Dec 1981

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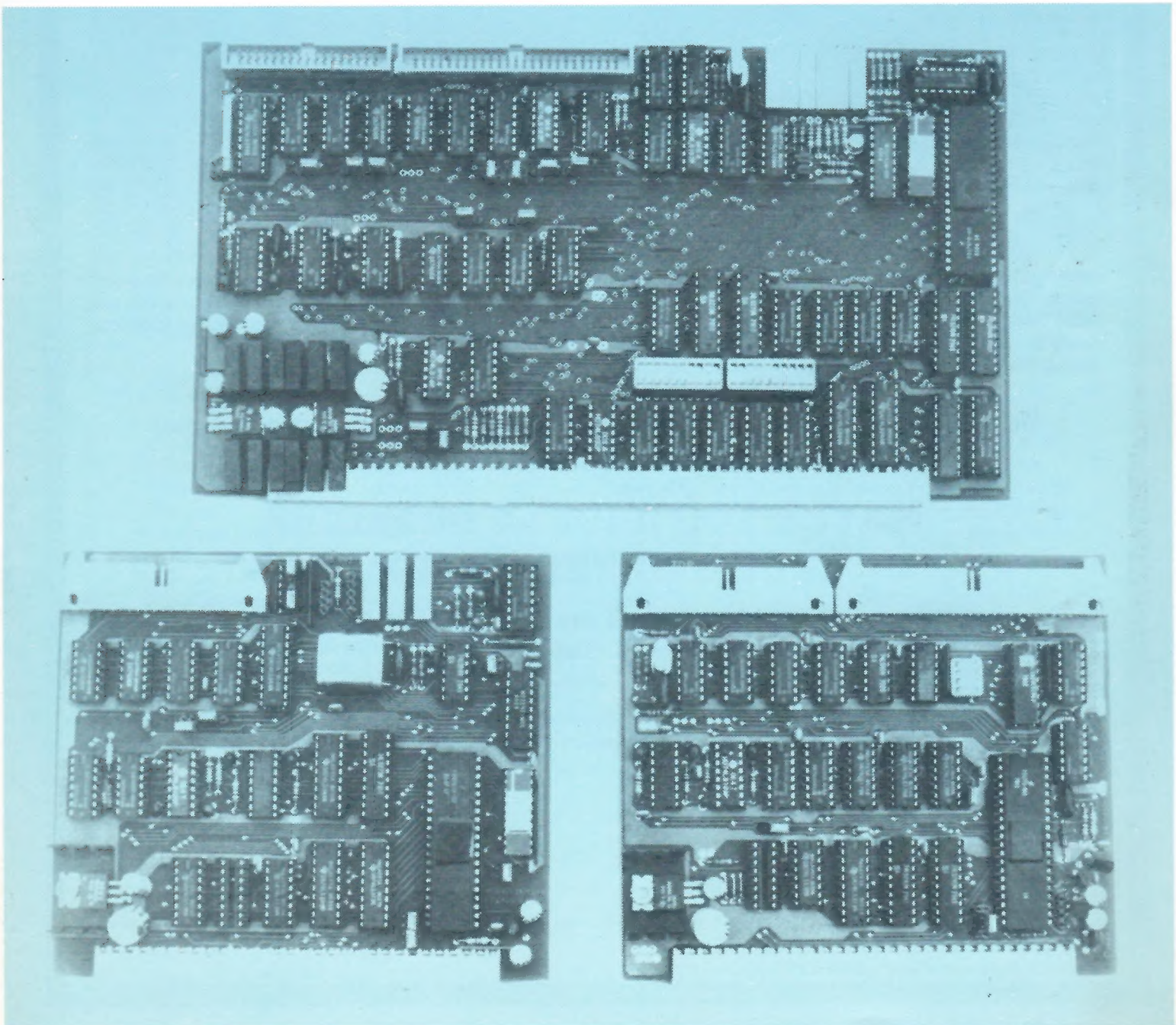
SS-50 Computing

for 6800 and 6809 users



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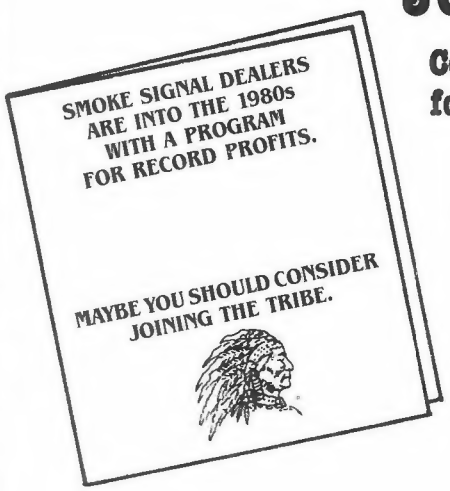

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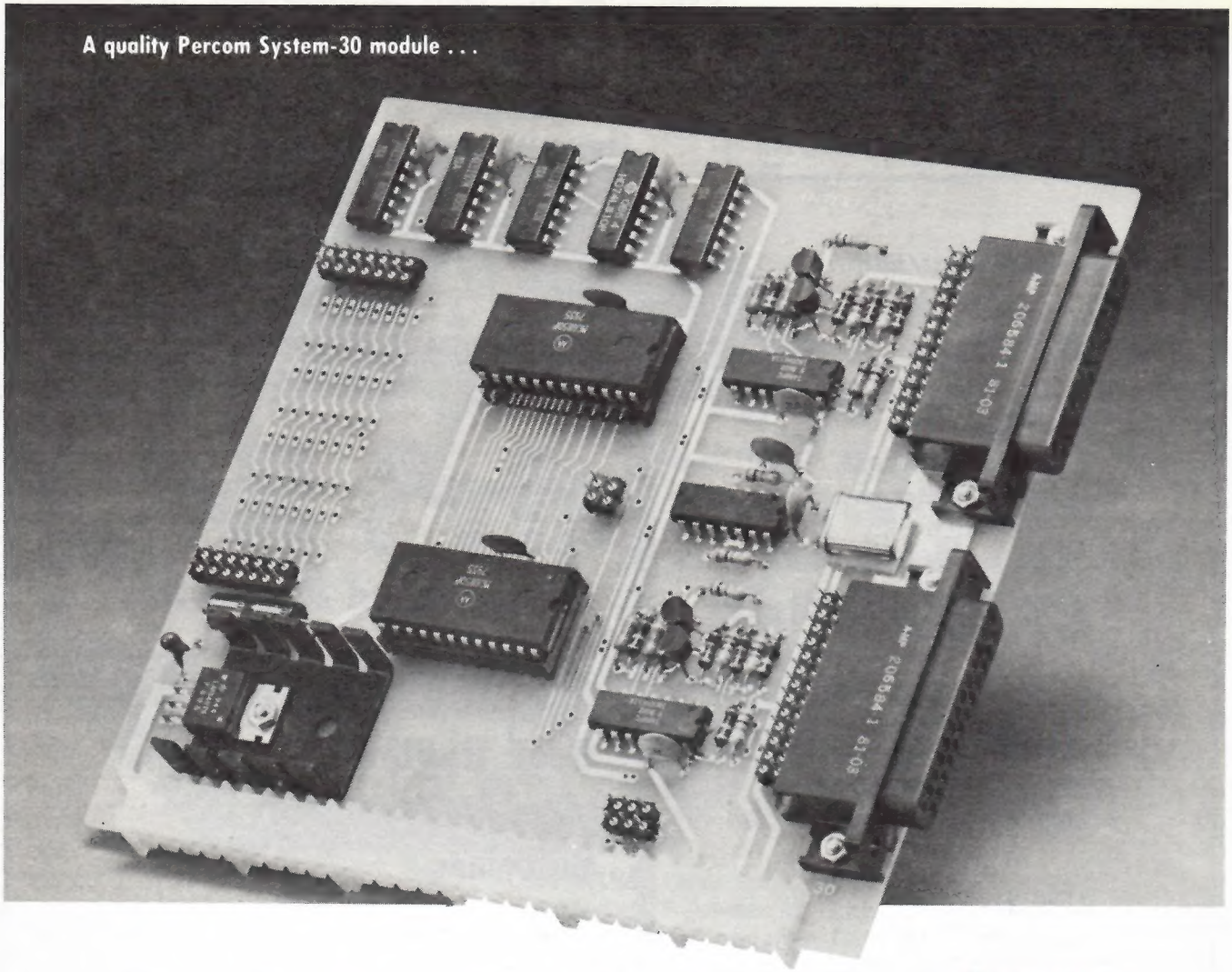

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ON THE COVER..Three GIMIX disk contoller boards. On top you see the GIMIX DMA Controller for 5 and 8 inch drives. On the bottom left is the Double Density Disk Contoller, with the 5/8 Disk Controller Board on the right. For information, see the Gimix Ad on the back cover.

SS-50 Computing tm

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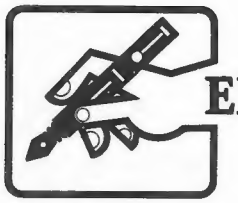
PLEASE forgive this issue for being late [again]...Just when we were getting caught-up, Myrphy's Law caught up to us. The typesetter broke down, and it took over 40 days to get the part from the manufacturer. We have now lengthened all expiration dates by two issues, except for the new subscribers. That should make-up for the problems caused to you.

Manuscripts submitted for publication should include sufficent return postage if needed to be returned. All materials should be original with full ownership rights by the said author. Programs submitted remain property of the author, with the exception that *SS-50 Computing* reserves the right to reprint the material in future publications.



EDITORIAL

by Ken Orme

If you are not aware, we have passed another point in SS-50 Bus history. For the second time we have seen the last of the SWTPC Computer kits. First it was the 6800 (no longer built or supported by Southwest Technical Products). Now it is the 6809 kit that is no longer sold. This is not to infer however, that they don't produce the 6809 in an assembled version.

I'm sure the reasons for the decision were all considered in depth before coming to the final conclusion, and there may be many reasons other than those I mention here. However, the main reason (as I was told by Dan Meyer at SWTPC) is due to the fact that Southwest did not want to go through all the problems of an FCC type approval for their "hobby" computers. A kit is considered a hobby computer. I don't blame them for not wanting to go through that.

However, one facet of no longer producing a particular product is that sometimes has a detrimental effect on selling future products. People lose faith if something they buy suddenly nc longer is available or no longer is supported by the manufacturer.

Another facet deals with the fact that Southwest Technical no longer is trying to sell to the "Hobbyist" market. That, by itself, may not be a problem to business, but how many sales will be lost to small business and industry by no longer trying to reach the hobby market? It seems many people tend to purchase computers for their business based on what they are familiar with on a hobby level. There are many SWTPC 6800's in school and industrial uses because of that one fact.

Still another facet of this is dropping one image and obtaining another. Since SWTPC has been in the hobby field for so long, it may take some time before the "business only" side of Southwest Technical catches on with the general public.

Conversely, some of the other SS-50 bus systems started out as business or industrial systems and have not only a good number of years in this area behind them, but have a good reputation as a business system going already.

Many people feel that we owe a great deal to Southwest Technical for coming out with the 6800 and getting most of us started. I can see that point clearly. However, I still feel that SWTPC owes a lot to the hobbyist, too! Without those that bought the kits (the hobbyist) SWTPC would not be able to produce the systems that they are selling now. In fact, without the hobbyist, I feel the SWTPC Computer would not have survived. It took the combined efforts of engineers and consumers to get the systems "debugged" and to run properly. Just ask someone who bought the early systems if you don't believe me.

I feel that there is room for both markets for computers based on the SS-50 bus. It's true that the SS-50 hobby market is not the biggest in the industry, but it is still a good market. The hobbyist has been loyal for many years. I hope that favor can be repaid.

[SS-50]

LETTERS

Dear Editor,

I need sources for software and help. Your newsletter is very helpful.

A. Lucas
Laguna Hills, CA

Dear Editor,

I would like to see more information on SSB and less on FLEX.

Ronald Baxter
Hayward, CA

We will be bringing more software for all machines and operating systems. It seems like the biggest problem comes from getting people to submit articles. After all, it is quite a chore to do the articles for everything. I suppose the reason FLEX is seen more often is that there are more people who have FLEX at this time.

Editor

Dear Editor:

Enclosed is my subscription for SS-50. I recently reviewed your magazine while purchasing a monitor "Humbug" from Star Kits. Your magazine looks great. Also I think your readers should know how superb Pete Stark of Star-Kits handled my inquiry.

Being only 15 miles away, he invited me over to try out his "Humbug". Well after trying it out, there was little doubt that it is head and shoulders over the one I was using. This monitor "Humbug" will perform so many tasks and quickly (too). It will do hex dumps, ASCII dumps, find 1 - 2 - or 3 bytes, boot my DOS, move memory, compare memory and others. The best ones are a built-in disassembler and single stepping with each step listing all registers. Great for machine code programming.

To top all this it is menu fed for us oldies with poor memories. I think anyone doing serious programming should use Humbug.

R. Scappatura
New York

We received a letter some time ago from Richard G. Cagle with regard to his patch to move SWTPC disk BASIC from Mini-FLEX to FLEX 2.0. He offers to do you a service by providing a copy of the article he wrote, the source code, and a binary code all for just sending him a formatted disk with appropriate return postage, or a cash equivalent. The disk to send should be a 5¼ FLEX 2.0 formatted disk.

Anyone wishing to take advantage of this generous offer should contact Richard at: 11103 Sagepark Lane, Houston, TX 77089.

Editor

Dear Editor:

I have for sale: SWTP CT-64 Terminal with 9 inch video monitor. RS-232 interface, up to 1200 baud, all options installed. Works fine. $150.

Congratulations on the new format...looks good!

Paul Pennington
2912 Palmetto Drive
Martinez, GA 30907
[404] 860-2934

Dear Editor,

Thank you for your response in the "OS9 Exchange" Sept/Oct issue to my recent letter. I am interested in learning as much as I can about OS9, as it appears to be a very good operating system.

However, you seem to have misinterpreted my third question, the one about adapting OS9 for non-standard peripherals. While your reply to this question was informative, I was really asking if Microware supplies instructions for writing I/O drivers and incorporating them into the system. (I am a fairly competent assembly language programmer.) If my present plans for my eventual 6809 system continue to be valid, my terminal and printer will be at non-standard port addresses and will have a non-standard protocol for "talking" to the computer. Even my disk drive(s), when I get one or more, are likely to be at non-standard port addresses.

One sometimes useful capability of an operating system to automatically read commands from a file after being "booted". (The name of this file would have to be built into the initialization sequence.) When all commands in the file have been executed, or if the user aborts this process, or if the file is not present, the terminal would then be used for command input. This capability could be used for issuing an appropriate TMODE command for the terminal, or for automatically starting an application program, or for some other purpose. (There may be other ways of accomplishing this function.)

As for the problem you mentioned of getting your printer to work with its "Inverted" busy/ready bit, I was reading an OS9 manual last April and I remember something about a device table which contains infor-

(Continued on page 20)

ANOTHER "OPEN DOOR" DETECTOR

Leo Taylor
18 Ridge Court West
West Haven, CT 06516

I'd like to contribute to the on-going series in *SS-50 Computing* called 'Open Door Patch'. This series is based on patches to FLEX disk drivers by William Hart and others to use the software to allow the disk to spin up to speed when accessed and to detect if a disk is in place.

I was enthusiastic about the patch when I read it in the Nov-Dec issue and after adding it to my FLEX source I was pleased to see it works as claimed. My enthusiasm waned when I noticed my file read speed had dropped. A few tests revealed the speed reduction to be 2:1 for mini-floppies and 3:1 for 8 inch disks. I soon found out why.

FORMATTING

FLEX formats a disk with the sectors interleaved. This interleaving is done by NEWDISK and is transparent to the user. I've dug rather deep into FLEX formatting since I have written my own Universal Disk Formatter program that allows me to alter the interleaving. The 'open Door Patch' destroys all the speed improvement that the interleaving accomplished. The patch requires that the disk revolve past the index hole after every sector so FLEX can no longer load two or three sectors per revolution. This is a fairly high price to pay for a DRIVE NOT READY error.

What is needed is a method to determine if a drive is ready that requires zero time. Software is not the answer since all drives must indicate ready status at once if you are going to access more than one drive in a program. The only way I can imagine doing this is with a hardware circuit per drive. Though not as easy as a software approach, hardware would be a 'no compromise' solution.

I set out to find the ideal design: two ICs maximum, fast acting, delay on startup, no foil cuts to drive, etc. I found the circuit didn't exist. The drive ready indicator used in eight inch drives was not acceptable since it didn't expect the drive to have motor control. My Shugart 800s will continue to indicate READY when the motor is unplugged! The only option was to design my own card.

THE CIRCUIT

The enclosed circuit will do the trick. It uses only two ICs, both of which can be ordered from most mail order dealers (Shugart uses these Ics in their drives). The board taps signals from the drive, but does not cut into any foils, thus not affecting the resale value of the drive. One board must be made for each drive, so I designed a small PC board so all my 6800 friends could take advantage of the circuit.

The ready signal is generated by a re-triggerable one-shot. The time delay is set to slightly over the period of the index pulses. The drive will indicate ready only when index pulses are present and repeating at full speed. The delay for motor speed-up is supplied by a second timer which is set for about ½ second. This delay only occurs when the motor starts up. The circuit output is wire ORed with the remaining drives and connected to the controller. The F&D controller I use has the needed inverter to connect the ready signal to the 1771 IC.

Other controllers may have to have an inverter provided and a pullup resistor.

SOFTWARE

Unfortunately the work is not completed with the hardware construction. The TSC FLEX-2 disk drivers cannot handle the 1771 ready bit. In fact, FLEX goes crazy when the ready bit is used. I found it invaluable to include a switch on my controller to ground the common ready line so I could boot standard FLEX disks. I wrote a new driver using ideas form TSC and F&D that handles the ready bit properly as well as a few other improvements. I have switching for drive type (I use 5 and 8 inch) as done by F&D. I increased the seek speed to 20/10 msec which is acceptable for four drives; this can be adjusted to suit the user. I removed the headload delay from the read routine and added it to the seek routine. Seek will only delay when the head NEEDS loading whereas read delayed 10 msec before every sector. With these drivers you can read SWTP fast disk format (used by 2 MHZ systems) at about 1.3 MHZ. Recent versions of NEWDISK had an unannounced sector interleaving change which makes the disk load very slowly (just like 'Open Door Patch'.

I will supply a copy of the driver to anyone who will send me a disk (5¼ or 8 inch single-sided, single-density) as well as an assortment of other utilities I've written, such as my disk formatter.

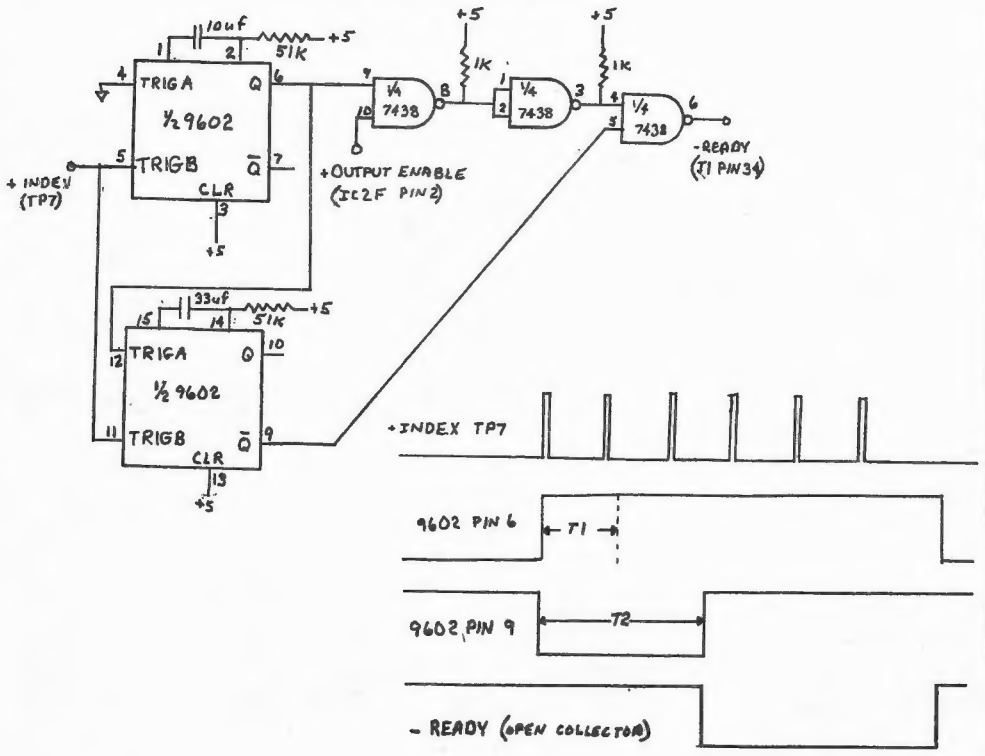
As a guide for testing disk speed, a normal TSC FLEX-2 disk driver should read a 100 sector text file in 14 seconds using the command: List FILENAME 9999. Be sure to use a freshly initialized disk. If you measure 30 seconds, you are only reading 1 sector per revolution. A SWTP fast format disk can be read in 12 seconds.

```
                    * WRITE SECTOR
                    *
BF07 8D DB          WRITE1  BSR    SEEK
BF09 86 AC                  LDA A  #$AC
BF0B 7D AC 34               TST    FBFLAG
BF0E 27 01                  BEQ    WRITE2
BF10 3F                     SWI
BF11 01             WRITE2  NOP
BF12 0F                     SEI
BF13 B7 80 18               STA A  COMREG   WRITE COMMAND
BF16 8D E8                  BSR    DELAY
BF18 20 03                  BRA    WRITE5   GET FIRST BYTE
                    *
BF1A B7 80 1B       WRITE3  STA A  DATREG   WRITE CHAR
BF1D A6 00          WRITE5  LDA A  0,X      GET CHAR FROM FCB
```

```
                    * DISK DRIVER FOR ACCUMULATOR I/O
                    * CONTROLLERS SUCH AS SWTP MF68 OR
                    * F&D MDI-1. THIS DRIVER HAS THE
                    * ADDITIONAL LOGIC FOR SELECTING THE
                    * TYPE OF DRIVE (5/8), OPERATION WITH
                    * 8 INCH DRIVES AT 1.25 MHZ, AND OPER-
                    * ATION WITH FAST FORMAT DISKS AT 1.3
                    * MHZ. HEAD STEPPING RATE IS SET UP FOR
                    * 20 MSEC ON 5 INCH (10 MSEC ON 8 INCH)
                    * WHICH IS ACCEPTABLE FOR SA-400/SA-800.
                    *
                    * ADDRESS EQUATES
                    *
8014                DRVREG  EQU    $8014    CONTROLLER REGISTERS
```

MINIFLOPPY READY DETECT

PIN NUMBERS FOR SA-400



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SOFTWARE

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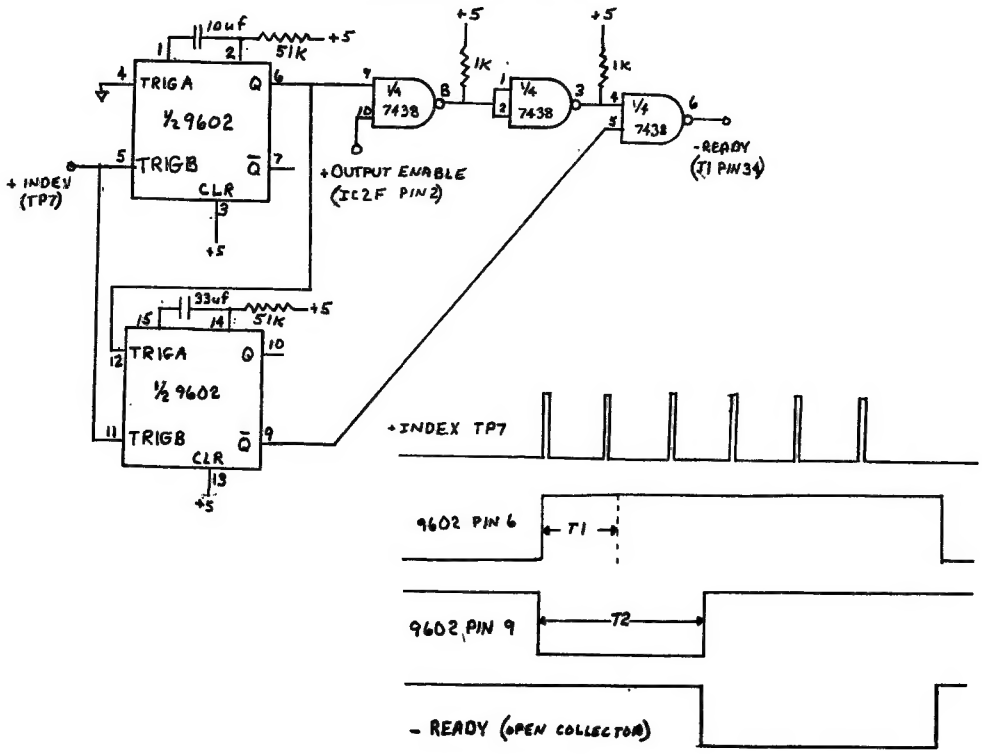
MINIFLOPPY READY DETECT

PIN NUMBERS FOR SA-400



```
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                    * CONTROLLERS SUCH AS SWTP MF68 OR
                    * F&D MDI-1.  THIS DRIVER HAS THE
                    * ADDITIONAL LOGIC FOR SELECTING THE
                    * TYPE OF DRIVE (5/8), OPERATION WITH
                    * 8 INCH DRIVES AT 1.25 MHZ, AND OPER-
                    * ATION WITH FAST FORMAT DISKS AT 1.3
                    * MHZ.  HEAD STEPPING RATE IS SET UP FOR
                    * 20 MSEC ON 5 INCH (10 MSEC ON 8 INCH)
                    * WHICH IS ACCEPTABLE FOR SA-400/SA-800.
                    *
                    * ADDRESS EQUATES
                    *
8014                DRVREG  EQU     $8014       CONTROLLER REGISTERS
```

```
                    * WRITE SECTOR
                    *
BF07 8D D8          WRITE1  BSR     SEEK
BF09 86 AC                  LDA A   #$AC
BF0B 7D AC 34               TST     FBFLAG
BF0E 27 01                  BEQ     WRITE2
BF10 3F                     SWI
BF11 01             WRITE2  NOP
BF12 0F                     SEI
BF13 B7 80 18               STA A   COMREG      WRITE COMMAND
BF16 8D E8                  BSR     DELAY
BF18 20 03                  BRA     WRITE5      GET FIRST BYTE

BF1A B7 80 19       WRITE3  STA A   DATREG      WRITE CHAR
BF1D A6 00          WRITE5  LDA A   0,X         GET CHAR FROM FCB
```

```
8015            TYPREG  EQU     $8015       USED BY F&D
8018            COMREG  EQU     $8018
8019            TRKREG  EQU     $8019
801A            SECREG  EQU     $801A
801B            DATREG  EQU     $801B

AC34            FBFLAG  EQU     $AC34       FOREGROUND/BACKROUND
AD00            COLDS   EQU     $AD00


                * JUMP TABLE MUST BE LOCATED HERE
                * FOR OPERATION WITH FLEX-2.  FOR
                * 6809 MOVE THE TABLE TO $DE00.
                *
BE80                    ORG     $BE80

BE80 7E BE B7   READ    JMP     READ1
BE83 7E BF 07   WRITE   JMP     WRITE1
BE86 7E BF 33   VERIFY  JMP     VRIFY1
BE89 7E BF 43   RESTOR  JMP     RESTR1
BE8C 7E BF 59   DRIVE   JMP     DRIVE1
BE8F 7E BF 98   CHECK   JMP     QCHEK1
BE92 7E BF 98   QCHECK  JMP     QCHEK1
BE95 00         DRIVEN  FCB     0           CURRENT DRIVE NUMBER
BE96 00                 FCB     0
BE97 00 00      TEMPX   FDB     0


                * TRACK TABLE STORES HEAD POSITION (TRACK)
                * FOR EACH DRIVE WHEN NOT BEING ACCESSED.
                *
BE99 00         TRKTBL  FCB     0           0
BE9A 00                 FCB     0           1
BE9B 00                 FCB     0           2
BE9C 00                 FCB     0           3
BE9D 00                 FCB     0           4
BE9E 00                 FCB     0           5
BE9F 00                 FCB     0           6
BEA0 00                 FCB     0           7
BEA1 00                 FCB     0           8
BEA2 00                 FCB     0           9

                * AUTO-CONFIGURE BLOCK OF ADDRESSES
                * FOR 6809 USE PROPER VECTORS
                *
BEA3 E1 AC      INVECT  FDB     $E1AC
BEA5 E1 D1      OUTVEC  FDB     $E1D1
BEA7 80 04      ACIA    FDB     $8004
BEA9 80 10      TIMER   FDB     $8010       +++ CLOCK +++
BEAB A0 00      IRQ     FDB     $A000
BEAD A0 12      SWI     FDB     $A012
BEAF E0 D0      MONITR  FDB     $E0D0
BEB1 A0 48      PCV     FDB     $A048


                * DRIVE TYPE TABLE
                * USED FOR F&D CONTROLLER
                *
BEB3 00         DRVTYP  FCB     0           0
BEB4 00                 FCB     0           1
BEB5 90                 FCB     $90         2
```

```
BF1F 08                 INX
BF20 F6 80 18   WRITE4  LDA B   COMREG
BF23 C5 02              BIT B   #2
BF25 26 F3              BNE     WRITE3
BF27 C5 01              BIT B   #1
BF29 26 F5              BNE     WRITE4

BF2B 09                 DEX
BF2C 8D C4              BSR     WAIT
BF2E C5 5C              BIT B   #$5C
BF30 01         CLRINT  NOP
BF31 0E                 CLI
BF32 39                 RTS


                * VERIFY LAST SECTOR WITH DUMMY READ
                *
BF33 86 8C      VRIFY1  LDA A   ##8C
BF35 7D AC 34           TST     FBFLAG
BF38 27 01              BEQ     VRIFY2
BF3A 3F                 SWI
BF3B 01         VRIFY2  NOP
BF3C 0F                 SEI
BF3D 8D AE              BSR     DOCOM
BF3F C5 18              BIT B   #$18
BF41 20 ED              BRA     CLRINT


                * RESTORE TO TRACK ZERO
                *
BF43 8D 14      RESTR1  BSR     DRIVE1
BF45 86 0A              LDA A   #$A         RESTORE SPEED
BF47 8D A4              BSR     DOCOM
BF49 C5 80              BIT B   #$80
BF4B 26 08              BNE     RESTR3
BF4D C5 40              BIT B   #$40
BF4F 27 02              BEQ     RESTR2
BF51 C6 0B              LDA B   #$B         FLAG WRITE PROTECT
BF53 0C         RESTR2  CLC
BF54 39                 RTS

BF55 C6 0F      RESTR3  LDA B   #$F
BF57 0D                 SEC                 FLAG NO DRIVE
BF58 39                 RTS


                * SELECT DRIVE FROM FCB
                *
BF59 FF BE 97   DRIVE1  STX     TEMPX
BF5C A6 03              LDA A   3,X
BF5E 81 03              CMP A   #3          MAX DRIVE NUMBER
BF60 23 01              BLS     UNDER3
BF62 4F                 CLR A               >3 BECOMES ZERO
BF63 B7 80 14   UNDER3  STA A   DRVREG      SELECT DRIVE
BF66 8D 3F              BSR     COUNTUP     TRACK TBL OF OLD DRIVE
BF68 F6 80 19           LDA B   TRKREG
BF6B E7 00              STA B   0,X         SAVE OLD TRACK REGISTER
BF6D B7 BE 95           STA A   DRIVEN      SAVE DRIVE NUMBER
BF70 8D 35              BSR     COUNTUP
BF72 A6 1A              LDA A   $1A,X       DRIVE TYPE
```

```
BEB6 90                 FCB     $90         3


                * READ SECTOR
                *
BEB7 8D 28      READ1   BSR     SEEK
BEB9 86 88              LDA A   #$88        NO HEAD LOAD
BEBB 7D AC 34           TST     FBFLAG
BEBE 27 01              BEQ     READ2
BEC0 3F                 SWI
BEC1 01         READ2   NOP
BEC2 0F                 SEI
BEC3 B7 80 18           STA A   COMREG
BEC6 8D 38              BSR     DELAY
BEC8 20 06              BRA     READ4

BECA B6 80 1B   READ3   LDA A   DATREG      GET CHAR
BECD A7 00              STA A   0,X         STORE IN FCB
BECF 08                 INX
BED0 F6 80 18   READ4   LDA B   COMREG      WAIT FOR DATA
BED3 C5 02              BIT B   #2
BED5 26 F3              BNE     READ3
BED7 C5 01              BIT B   #1
BED9 26 F5              BNE     READ4

BEDB 8D 15              BSR     WAIT
BEDD C5 1C              BIT B   #$1C        SET CONDITION CODES
BEDF 20 4F              BRA     CLRINT



                * SEEK TRACK A SECTOR B
                *
BEE1 B7 80 1B   SEEK    STA A   DATREG      DESIRED TRACK
BEE4 8D 1A              BSR     DELAY
BEE6 F7 80 1A           STA B   SECREG      DESIRED SECTOR
BEE9 8D 15              BSR     DELAY
BEEB 86 1A              LDA A   #$1A        HEAD LOAD AND SEEK SPEED
BEED B7 80 18   DOCOM   STA A   COMREG
BEF0 8D 0E              BSR     DELAY



                * WAIT UNTIL READY
                *
BEF2 7D AC 34   WAIT    TST     FBFLAG
BEF5 27 01              BEQ     WAIT2
BEF7 3F                 SWI
BEF8 F6 80 18   WAIT2   LDA B   COMREG
BEFB C5 01              BIT B   #1
BEFD 26 F3              BNE     WAIT
BEFF 39                 RTS



                * WASTE TIME FOR COMMAND TO TAKE
                *
BF00 8D 00      DELAY   BSR     DELAY2
BF02 8D 00      DELAY2  BSR     DELAY3
BF04 8D 00      DELAY3  BSR     DELAY4
BF06 39         DELAY4  RTS
```

```
BF74 B7 80 15           STA A   TYPREG
BF77 A6 00              LDA A   0,X         GET TRACK
BF79 B7 80 19           STA A   TRKREG      TRACK OF NEW DRIVE
BF7C BD BF 00           JSR     DELAY
BF7F CE 10 00           LDX     #$1000      +++ DELAY FOR MOTOR +++
BF82 B6 80 19   WAITRD  LDA A   TRKREG      PRESENT TRACK
BF85 5F                 CLR B               DUMMY SECTOR
BF86 BD BE E1           JSR     SEEK        GET STATUS
BF89 F6 80 18           LDA B   COMREG
BF8C 2A 14              BPL     ISRDY
BF8E 09                 DEX
BF8F 26 F1              BNE     WAITRDY
BF91 FE BE 97   NOTRDY  LDX     TEMPX
BF94 C6 80              LDA B   #$80
BF96 0D                 SEC
BF97 39                 RTS

                * CHECK DRIVE READY
                * ANY DRIVE CAN SKIPPED BY DRIVE SCAN
                * CURRENTLY SET TO SKIP DRIVE >3
                *
BF98 A6 03      QCHEK1  LDA A   3,X
BF9A 81 04              CMP A   #4
BF9C 24 F3              BHS     NOTRDY      DRIVE 4 NEVER READY
BF9E 8D B9              BSR     DRIVE1      SELECT
BFA0 25 EF              BCS     NOTRDY      HARDWARE
BFA2 FE BE 97   ISRDY   LDX     TEMPX
BFA5 0C                 CLC
BFA6 39                 RTS

BFA7 CE BE 98   COUNTUP LDX     #TRKTBL-1
BFAA F6 BE 95           LDA B   DRIVEN
BFAD 08         COUNT   INX
BFAE 5A                 DEC B
BFAF 2A FC              BPL     COUNT
BFB1 39                 RTS

                END     COLDS

NO ERROR(S) DETECTED
```

```
FLEX DISK DRIVER                    8-30-81  TSC ASSEMBLER  PAGE


   SYMBOL TABLE:

ACIA   BEA7    CHECK  BE8F    CLRINT BF30    COLDS  AD00    COMREG 8018
COUNT  BFAD    COUNTU BFA7    DATREG 801B    DELAY  BF00    DELAY2 BF02
DELAY3 BF04    DELAY4 BF06    DOCOM  BEED    DRIVE  BE8C    DRIVE1 BF39
DRIVEN BE95    DRVREG 8014    DRVTYP BEB3    FBFLAG AC34    INVECT BEA3
IRQ    BEAB    ISRDY  BFA2    MONITR BEAF    NOTRDY BF91    OUTVEC BEA6
PCV    BEB1    QCHECK BE92    QCHEK1 BF98    READ   BE80    READ1  BE87
READ2  BEC1    READ3  BECA    READ4  BED0    RESTOR BE89    RESTR1 BF43
RESTR2 BF53    RESTR3 BF55    SECREG 801A    SEEK   BEE1    SWI    BEAD
TEMPX  BE97    TIMER  BEA9    TRKREG 8019    TRKTBL BE99    TYPREG 8015
UNDER3 BF63    VERIFY BE86    VRIFY1 BF33    VRIFY2 BF3B    WAIT   BEF2
WAIT2  BEF8    WAITRD BF82    WRITE  BE83    WRITE1 BF07    WRITE2 BF11
WRITE3 BF1A    WRITE4 BF20    WRITE5 BF1D
```

MAGIC SPELL REVIEW

by Ken Orme

One of the things that I have needed for a long time is a spelling checker. I'm sure that most of you have noticed a few spelling errors in almost everything written or published. Some are "typographical" errors put there when things were typeset and others probably came about through neglect. Still, we don't claim to be the most perfect publication out of all the computer magazines like one magazine has. But, the means now exists where we can all produce more correct copy. This comes from *Magic Spell* (tm) from Star-Kits. *Magic Spell* is a program designed to check text files for spelling and typographical errors. It is an extremely useful program for anyone doing writing and/or word processing.

When we received our copy of *Magic Spell* several months ago, I had no idea how the program would handle so many formats of text files. After all, there are several different types of text editors and processors each one with a slightly different set of codes on the disk. Well, after using the program for some time now, I dare say it will do a nice job with any text file in FLEX.

Briefly, *Magic Spell* compares each word in your text file against a dictionary file and prints out every word which does not appear in the dictionary. As you might realize, even a dictionary file with over 10,000 words (as this one has) will not be able to contain every word that you may use. Therefore, you have several other options rather than just have the program run.

The first option is to ignore the questionable word. If *Magic Spell* comes upon a word that is not in the dictionary, it will ask what you would like to do with the displayed word. If you type "I" it will then ignore that word and not print it or mark it. This is especially important if you have many words that are technical in nature or abbreviations that are used and you know that they are correct as written. After you type an I, *Magic Spell* goes on to the next word.

Another option that is available is "M", to mark the word that is displayed. If you are certain the word is misspelled, or if you are not sure, this will probably be the thing to use. If you want it marked, it will also mark the source file with three asterisks after the incorrect word. This makes it easy to find with almost any editor available. If you would like *Magic Spell* to change the word for you in the text, there is an option for that, too. When this part of the option is selected, you will type in the correct word, rather than having the program get something out of context. And as I explain later, some of the text is printed on the screen so that you may see the word in context.

The third option is to type an "A" which means to add the word to the dictionary so that it will be there in the future. This is one of the best parts of the *Magic Spell* program. It allows you build your dictionary to the point where you have almost all the "unique"

words for your future use. This feature also allows you to add names and other words or abbreviations that are often used.

The fourth option is the fast mark option. It will allow you to mark all the words automatically without other prompts. This makes it a fast method to send questionable words to the printer, or if you want to "walk away" while it works, you can do so. Needless to say, this option uses the "F" to select it.

A fifth option is "Q", to quit and return to the DOS.

The thing that I like most about *Magic Spell*, is the fact that it does *not* make the corrections in the text for you, unless you choose to have it do so. It lets you know of probable errors and can mark them for you, but gives you the choice of making the actual corrections in the text of doing it for you. Why do I like this part of the package? Mainly because I use several different editors, and with a few of them it would make some difference in line length to have extra letters placed on a line, which in turn may not justify properly. Also, there are times when the context must be changed when an error is spotted, not just the word itself changed. *Magic Spell* does print out the previous three or four lines of text up to and including the word that is questionable so that you can see it in context and help you decide what to do.

As far as using *Magic Spell* is concerned, it is very straight forward and easy to operate. We have found it to be one of the easier programs to learn. It reminds me of some of the more lengthy utility programs such as FORMAT or NEWDISK. There are a few things to remember, but almost everything is given in the prompts.

The manual is very good as far as information on how to run the program. It also includes examples that you can try on your machine. The manual includes information on how to output the words to the printer (for those not familiar with that), and information on reassembling the source code (which comes with it).

That is another nice feature about *Magic Spell*: the source code comes with the program. This allows you the opportunity to run the program on the 6800 or the 6809 and make different versions for different disk operating systems. One thing to remember, however, is that the source is not position independent. So those who wish to run it on OS-9 or UniFLEX will either have to rewrite the source or wait until it comes out on OS-9.

All the error messages are printed out so that you don't have to look up each one in the manual. Most errors that are serious will be fatal to the program, and will return to DOS. The more simple ones are those where you may forget to give the input file name, or where the file is not on the disk, etc.

Here are a few other things that you should know to see if this program will fit your needs. The words in the text file are allowed up to 31 characters. Anything longer is truncated. Hyphens at the end of the line are ignored, and the word is compared as though it were not hyphenated.

Peter Stark also makes the manual very comprehensive by including pages dealing with the source text file with more specific information on selecting "all" words or "selected" words to compare to the dictionary, and file name specifications. There is a lot of information on the dictionary file itself: how it is prepared, edited, etc. This section is extremely informative for those with limited disk size or those who may want to cut the dictionary down for other reasons. Also, information on how to expand the dictionary size are included. One method given is to remove the end of file marker from the dictionary, and use a second or third disk to continue the dictionary. Then by adding the end of file marker to the end of the last disk, you will be able to have more than one disk for the dictionary. The one thing that is cautioned, however, is that the words must be in correct order whenever they are placed in the dictionary file.

The program is very powerful especially for the price. It is very seldom that you can find a program where the 10,000 plus word dictionary and the program are purchased for the price of this one, not alone a second program for another processor and the source code. And it all is less then $90.00. There were only a couple of mistakes in the first dictionary files that went out, and since have been corrected. That is the only problem that I know of, since it has been running for us without a problem.

Since we received the *Magic Spell* program, Peter Stark has also come out with an expanded version of it for more serious applications. This version contains a 75,000 word dictionary and is designed for 6809 systems only. This version sells for less then $240.00. The regular version of *Magic Spell* that we review here runs on both the 6800 and 6809 machines using FLEX, 6000 Mini-FLEX, and PERCOM systems. The OS-9 and SSB versions are being finished and will be available soon.

I feel that *Magic Spell* is a superior product and is just what you need if you do word processing, writing, or use you computer for other business applications where spelling is a factor.

[SS-50]

A 6809 "LIFE" Program

By Douglas Beck

The "Life" program is an interesting exercise in programming as well as being very interesting to watch perform on the CRT. This version was created some years ago by persons unknown, and fixed up to run under FLEX 9.0 when I got the 6809 CPU. In its present form it is not position independent. After considerable work, I finally arrived at the conclusion that independence was not worth the effort. A machine so occupied was not likely to be doing anything else.

The main features of this implementation are first, it is fast. Generations have to be delayed between displays to permit time to look at the pattern. Second, it does not depend on anyone's clone of Mikbug to operate. If you have FLEX 9, that is enough, and is where the interface to the outside world should occur anyway. So many otherwise useful programs are cluttered by references to someone's very special ROM. These gadgets could be and should be replaced by operating system references or by constructing a library file that may be referenced by a LIB call in the Assembler.

Adaptation to your own system will require modification of the code at line 121 and again at line 127 to substitute the appropriate characters to control the "Clear screen" and "cursor home" function on your terminal or video display board.

Running the program, once it is debugged involves invoking it as a command file. The program will prompt for entry of any character from the keyboard, after which it will clear the scree and begin creating display generations. Each key will cause a different initial generation to be created via the subroutine RAND. For starters, the "space" key will create a pattern that will run well over 400 generations. For the user's edification, a generation counter and population counter have been included at the top of the display.

There are no other special hardware requirements other than a minimum FLEX system and dumb terminal. I hope you enjoy the program as much as I have.

```
LIFE                    7-16-81 TSC ASSEMBLER   PAGE    1

                        * "Life" game, a loose adaptation
                        * by Doug Beck  Los Altos, CA
0000                            ORG     0
0000 16   2044          LIFE    LBRA    RAN
0003 01                 VN      FCB     1           Version 1
                        * Vectors
0004 CD24               CRLF    FDB     $CD24
0006 CD3C               PR1B    FDB     $CD3C
0008 CD18               OUTCH   FDB     $CD18
000A CD15               INCH    FDB     $CD15
000C CD1E               PDATA   FDB     $CD1E
000E CE84               PLDATA  FDB     $CE84
0010 CD03               WARMS   FDB     $CD03
                        * Constants
0012 07                 MASK    FCB     %00000111
0013 20                 BLNK    FCC     ' '
0014 23                 MARK    FCC     '#'
0015 01                 TIME    FCB     1
0016 3F                 ROWLEN  FCB     64-1
0017 0F                 COLLEN  FCB     16-1
0018 10                 OFFS    FCB     $10
0019 0036               BASE    FDB     TABLE
001B 2710 03E8          HEXBCD  FDB     10000,1000,100,10,1
             0025       HEXEND  EQU     *
                        * Variables
0025                    RND     RMB     2
0027                    GENERN  RMB     2
0029                    POPULN  RMB     2
002B                    ADDR    RMB     2
002D                    COUNT   RMB     1
002E                    X0      RMB     1
002F                    Y0      RMB     1
0030                    X1      RMB     1
0031                    Y1      RMB     1
0032                    DX      RMB     1
0033                    DY      RMB     1
0034                    YES     RMB     1
0035                    DIGIT   RMB     1
0036                    TABLE   RMB     4096
1036                    TABLE1  RMB     4096
             2036       ENDTAB  EQU     *
                        *
             2036       WAIT    EQU     *           TIMEOUT LOOP
2036 96   15                    LDA     TIME        times thru inner loop
2038 34   02            W0      PSHS    A
203A 8E   0FFF                  LDX     #$FFF
203D 30   1F            W1      LEAX    -1,X        inner timing loop
203F 26   FC                    BNE     W1
2041 35   02                    PULS    A
2043 4A                         DECA
2044 26   F2                    BNE     W0
2046 39                         RTS
                        *
```

```
2133 2A   F0                    BPL     TSTCEL
2135 86   49                    LDA     #'I         print right margin
2137 AD   9F 0008               JSR     ↑OUTCH←
213B 96   16                    LDA     ROWLEN
213D 97   2E                    STA     X0
213F 0A   2F                    DEC     Y0
2141 2A   D8                    BPL     RLOOP
2143 AD   9F 0004               JSR     ↑CRLF←
2147 30   8D 00F3               LEAX    LINE,PCR    print lower border
214B AD   9F 000E               JSR     ↑PLDATA←
214F 17   FEE4                  LBSR    WAIT
                        * NEXT GENRN
2152 8E   0000                  LDX     #0          start with zero popuin
2155 9F   29                    STX     POPULN
2157 9F   2E                    STX     X0
2159 0F   34            COMP    CLR     YES
                        * See if cell occupied this senrn
215B 96   2E                    LDA     X0
215D D6   2F                    LDB     Y0
215F 17   008C                  LBSR    CADDR
2162 A6   84                    LDA     ,X          check if cell occupied
2164 97   34                    STA     YES
2166 8D   4E                    BSR     CELL
                        * Check neighbor count + yes
2168 96   2D                    LDA     COUNT       check count of neighbors
216A 81   03                    CMPA    #3          to determine whether
216C 27   09                    BEQ     SET         to retain cell
216E 81   02                    CMPA    #2
2170 26   04                    BNE     CLR
2172 0D   34                    TST     YES
2174 26   01                    BNE     SET
2176 4F                 CLR     CLRA
2177 97   2D            SET     STA     COUNT
2179 27   06                    BEQ     NONE
217B 9E   29                    LDX     POPULN
217D 30   01                    LEAX    1,X
217F 9F   29                    STX     POPULN
2181 96   19            NONE    LDA     BASE
2183 9B   18                    ADDA    OFFS
2185 97   19                    STA     BASE
2187 96   2E                    LDA     X0
2189 D6   2F                    LDB     Y0
218B 8D   61                    BSR     CADDR
218D 96   2D                    LDA     COUNT
218F A7   84                    STA     ,X
2191 96   19                    LDA     BASE
2193 90   18                    SUBA    OFFS
2195 97   19                    STA     BASE
2197 96   2E                    LDA     X0
2199 4C                         INCA
219A 97   2E                    STA     X0
219C 91   16                    CMPA    ROWLEN
219E 23   B9                    BLS     COMP
21A0 0F   2E                    CLR     X0
21A2 D6   2F                    LDB     Y0
```

```
                    2047   RAN     EQU     *           Gen random 0th senern
2047 32   8D 02AD           LEAS    STACK,PCR
204B 8D   52              BSR     INIT
204D 30   8D 0233         LEAX    ASK,PCR
2051 AD   9F 000C         JSR     *PDATA*     Ask for seed
2055 AD   9F 000A         JSR     *INCH*      set it from kbd
2059 97   25             STA     RND
205B 98   04             EORA    CRLF        begin randomize
205D 97   26             STA     RND+1
205F AD   9F 0004         JSR     *CRLF*
2063 96   2E             R1      LDA     X0          store rnd marks in table
2065 D6   2F             LDB     Y0
2067 17   0184           LBSR    CADDR
206A 6F   84             CLR     ,X
206C 8D   1C             BSR     RAND
206E 27   02             BEQ     NEXTR
2070 6C   84             INC     ,X
2072 96   2E             NEXTR   LDA     X0
2074 4C                  INCA
2075 97   2E             STA     X0
2077 91   16             CMPA    ROWLEN      do until row filled
2079 2F   E8             BLE     R1
207B 8D   0D             BSR     RAND
207D 0F   2E             CLR     X0
207F D6   2F             LDB     Y0
2081 5C                  INCB
2082 D7   2F             STB     Y0
2084 D1   17             CMPB    COLLEN      do until cols filled
2086 23   DB             BLS     R1
2088 20   39             BRA     START       GO TO IT
                    *
208A 96   25             RAND    LDA     RND
208C 48                  ASLA
208D 98   25             EORA    RND
208F 48                  ASLA
2090 48                  ASLA
2091 09   26             ROL     RND+1
2093 09   25             ROL     RND
2095 96   26             LDA     RND+1
2097 94   12             ANDA    MASK
2099 27   02             BEQ     RSET
209B 4F                  CLRA
209C 39                  RTS
209D 43                  RSET    COMA
209E 39                  RTS
                    *
                209F    INIT    EQU     *
209F 8E   0000           LDX     #0
20A2 9F   27             STX     GENERN      seneration zero
20A4 9F   2E             STX     X0
20A6 30   01             LEAX    1,X
20A8 9F   29             STX     POPULN      population at least 1
20AA 86   10             LDA     #$10
20AC 97   18             STA     OFFS
```

```
21A4 5C                  INCB
21A5 D7   2F             STB     Y0
21A7 D1   17             CMPB    COLLEN
21A9 23   AE             BLS     COMP
                    * All done, switch to new senrn
21AB 96   19             LDA     BASE
21AD 9B   18             ADDA    OFFS
21AF 97   19             STA     BASE
21B1 00   18             NEG     OFFS
21B3 16   FF19           LBRA    RUN
                    *
                21B6    CELL    EQU     *
21B6 8E   FFFF           LDX     #-1
21B9 9F   32             STX     DX
21BB 0F   2D             CLR     COUNT
21BD 8D   1E             LOOP    BSR     NEIGHB
21BF 0C   32             LOOP1   INC     DX
21C1 27   14             BEQ     TST1
21C3 86   02             LDA     #2
21C5 91   32             CMPA    DX
21C7 26   F4             BNE     LOOP
                    * if past right neighb then reset to left
                    * and move down one row
21C9 86   FF             LDA     #-1
21CB 97   32             STA     DX
21CD 96   33             LDA     DY
21CF 4C                  INCA
21D0 97   33             STA     DY
21D2 81   02             CMPA    #2
21D4 26   E7             BNE     LOOP
21D6 39                  RTS
                    *
21D7 0D   33             TST1    TST     DY
21D9 26   E2             BNE     LOOP
21DB 20   E2             BRA     LOOP1
                    *
                21DD    NEIGHB  EQU     *           check for no. neighbors
21DD 96   2E             LDA     X0
21DF 9B   32             ADDA    DX
21E1 D6   2F             LDB     Y0
21E3 DB   33             ADDB    DY
21E5 8D   07             BSR     CADDR
21E7 6D   84             TST     ,X
21E9 27   02             BEQ     N1
21EB 0C   2D             INC     COUNT
21ED 39                  N1      RTS
                    *
                21EE    CADDR   EQU     *           calc effective addr
21EE 97   30             STA     X1
21F0 D4   17             ANDB    COLLEN
21F2 D7   31             STB     Y1
21F4 96   16             LDA     ROWLEN
21F6 08   30             C1      ASL     X1
21F8 48                  ASLA
```

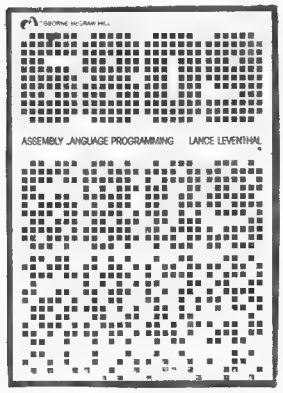
```
20AE 30   8D DF84          LEAX   TABLE,PCR
20B2 9F   19               STX    BASE
20B4 31   8D EF7E          LEAY   TABLE1,PCR
20B8 34   20               PSHS   Y
20BA 6F   80        ILP1   CLR    ,X+          clear the table
20BC AC   E4               CMPX   ,S           table end
20BE 26   FA               BNE    ILP1
20C0 32   62               LEAS   2,S          tidy stack
20C2 39                    RTS
                    *
20C3 86   1B        START  LDA    #$1B         control chrs for Bantam
20C5 AD   9F 0008          JSR    ↑OUTCH←      clear screen function
20C9 86   4B               LDA    #'K          revise as needed
20CB AD   9F 0008          JSR    ↑OUTCH←
                    *
          20CF     RUN    EQU    *
20CF 86   1B               LDA    #$1B         control chrs for Bantam
20D1 AD   9F 0008          JSR    ↑OUTCH←      home the cursor functio
20D5 86   48               LDA    #'H          revise as needed
20D7 AD   9F 0008          JSR    ↑OUTCH←
20DB 30   8D DF48          LEAX   GENERN,PCR
20DF 17   0131             LBSR   POP          print generation numbe
20E2 86   20               LDA    #$20
20E4 AD   9F 0008          JSR    ↑OUTCH←
20E8 AD   9F 0008          JSR    ↑OUTCH←
20EC 30   8D DF39          LEAX   POPULN,PCR
20F0 17   0120             LBSR   POP          print population
20F3 AD   9F 0004          JSR    ↑CRLF←
20F7 9E   27               LDX    GENERN       genern := genern # 
20F9 30   01               LEAX   1,X
20FB 9F   27               STX    GENERN
20FD 8E   0000             LDX    #0
2100 9C   29               CMPX   POPULN       if populn = 0 
2102 26   04               BNE    CONT
2104 6E   9F 0010          JMP    ↑WARMS←
                    *
2102 2108 9E   16   CONT    LDX    ROWLEN
210A 9F   2E               STX    X0
210C 30   8D 012E          LEAX   LINE,PCR     print upper border
2110 AD   9F 000E          JSR    ↑PLDATA←
2114 4F                    CLRA
2115 5F                    CLRB
2116 17   00D5             LBSR   CADDR
2119 20   04               BRA    FIRST
2115 211B AD   9F 0004 RLOOP  JSR    ↑CRLF←
2119 211F 86   49      FIRST  LDAA   #'I          print left margin
2121 AD   9F 0008          JSR    ↑OUTCH←
2125 96   13        TSTCEL LDA    BLNK
2127 6D   80               TST    ,X+
2129 27   02               BEQ    PRINT
212B 96   14               LDA    MARK         print occupied cells
212D AD   9F 0008  PRINT   JSR    ↑OUTCH←
2131 0A   2E               DEC    X0
```

```
21F9 2A   FB               BPL    C1
21FB 47             C2     ASRA
21FC 25   06               BCS    C3
21FE 07   31               ASR    Y1
2200 06   30               ROR    X1
2202 20   F7               BRA    C2
2204 96   30        C3     LDA    X1
2206 D6   31               LDB    Y1
2208 9B   1A               ADDA   BASE+1
220A D9   19               ADCB   BASE
220C 97   2C               STA    ADDR+1
220E D7   2B               STB    ADDR
2210 9E   2B               LDX    ADDR
2212 39                    RTS
                    *
2213 EC   84        POP    LDD    ,X           hex-bcd convert & print
2215 30   8D DE02          LEAX   HEXBCD,PCR
2219 31   8D DE08          LEAY   HEXEND,PCR
221D 34   20               PSHS   Y
221F 0F   35        FB     CLR    DIGIT
2221 0C   35        FE     INC    DIGIT
2223 A3   84               SUBD   ,X           sub curr hex const
2225 24   FA               BCC    FE
2227 E3   84               ADDD   ,X           add it back if too large
2229 34   02               PSHS   A
222B 96   35               LDA    DIGIT
222D 8B   2F               ADDA   #$2F         make it ASCII
222F AD   9F 0008          JSR    ↑OUTCH←
2233 35   02               PULS   A
2235 30   02               LEAX   2,X          next constant
2237 AC   E4               CMPX   ,S           compare hexend
2239 26   E4               BNE    FB
223B 32   62               LEAS   2,S          tidy stack
223D 39                    RTS
                    *
223E 20 2B 2D 2D   LINE    FCC    ' +---+---+---+---+---+---+---+---+'
2260 2D 2D 2D 2B           FCC    '---+---+---+---+---+---+---+---+'
2280 0D 0A 00 04           FCB    $D,$A,0,4
                    *
                   TEXT    MACRO
                           FCC    '&1'
                           FCB    4
                           ENDM
                    *
2284               ASK     TEXT   "TYPE      SOMETHING!"
                    *
2294                       RMB    100         ROOM FOR STACK
          22F8     STACK   EQU    *
                           END    LIFE

0 ERROR(S) DETECTED
```

6809 ASSEMBLY LANGUAGE PROGRAMMING

Lance A. Leventhal
Osborne/McGraw-Hill



Review by Gary Manning

Having read several of Dr. Leventhal's books and even using a few as college texts, I have greatly appreciated his deep understanding of computer hardware and software. Occasionally though, I have felt that he was a bit too assuming on the reader's background. With this book however, I feel that the author has done a very good job of covering the subject thoroughly enough for the novice, and yet move quickly enough to keep the interest of those with programming experience.

The book has 21 chapters divided among four sections of from three to six chapters each, a fifth section on the instruction set, and five appendices. A comprehensive index is also included. The sections include:

Section I
Fundamental Concepts
3 chapters - 82 pages

An introduction to computer languages, a discussion on assemblers, and an introduction to the 6809, its machine structure, instruction set, and addressing modes.

Section II
Introductory Problems
6 chapters - 138 pages

Discusses problem solving and introduces simple load and store programs. Then advances through loops, coding and code conversion, arithmetic problems, and tables and lists.

Section III
Advanced Topics
6 chapters - 101 pages

Discusses subroutines, parameter passing, interrupts, and contains about 60 pages on using the 6820 PIA and 6850 ACIA.

Section IV
Software Development
6 chapters - 101 pages

Includes problem definition, program design, debugging, testing, and maintenance and redesign. These discussions are informative yet concise and explain some advantages and disadvantages of the various techniques presented.

Section V
6809 Instruction Set
75 pages

Detailed information about each instruction.

Appendicies

A. Summary of the 6809 instruction set. 18 pages.

B. Summary of 6809 indexed and indirect addressing modes.

C. 6809 Instruction codes, memory requirements, and execution times. 4 pages.

D. 6809 instruction object codes in numerical order. 6 pages.

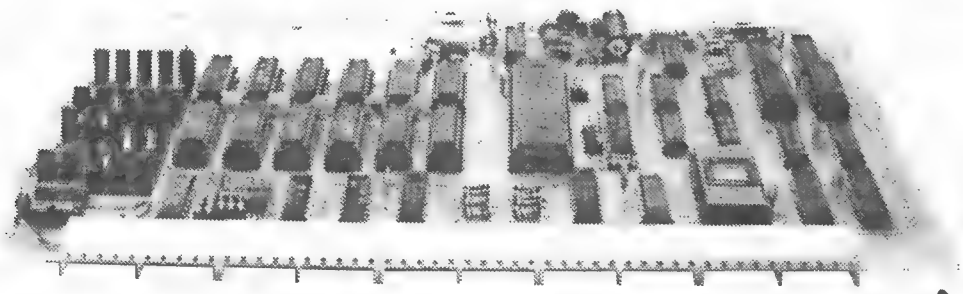
E. 6809 post bytes in numerical order. 1 Page.

The book has been printed with boldface type to present the material and lightface type to expand upon it. Another feature that I like is that the programming examples (there are 65 of them) are interesting and in many cases, even useful. This enhances the value of the book as a reference as well as a tutorial text. Also, the problems are explained clearly and are not so difficult that they become frustrating. I have found the book to be very useful and highly recommend it to anyone who does assembly language programming, or would like to learn.

[*SS-50*]

Now! Color for Your . . .

SYSTEM-50



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eaturing . . .

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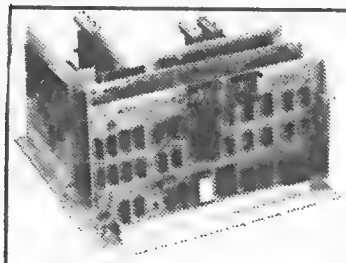

SS-50 Bus Department Store

Nobody supports the SS-50 bus like Percom:

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- ✓ LFD-400/800 1-, 2- and 3-drive mini-disk systems
- ✓ Color and monochrome memory-mapped display controllers
- ✓ Extendable 7-slot SS-50 bus motherboards
- ✓ Versatile prototyping boards: SS-50 and SS-30 bus
- ✓ Field-proven software: monitors, operating systems, drivers, editors, assemblers, debuggers and HLLs.

- **Mix in Sound:** With the optional modulator installed, you can complement your colorful displays with software-controlled audio.
- **Extended Addressing:** The COLO*RAMA*-50™ is compatible with the SS-50A bus *and* the extended-address SS-50C bus. Map the board into any of the sixteen 64-Kbyte banks of the 1-Mbyte SS-50C address space. The COLO*RAMA*-50™ card "defaults" to the first (lowest) bank for the SS-50A bus.
- **Cassettee I/O Option:** Add a few inexpensive components to the on-card circuitry provided and use an audio cassette for program/data storage.
- **Provision for On-Card Firmware:** Put your display operating system, cassette control program, etc. right on the COLO*RAMA*-50™ card in a 2516 (5-volt 2716) EPROM. Resides in the top 2-Kbyte of the card memory space.
- **Operating Software:** Included in the comprehensive users manual is a listing of a display operating system and cassette controller that may be implemented as a callable subroutine function from BASIC or existing operating systems. The programs are optionally available in a plug-in ROM for just $69.95.

System Requirements

The COLO*RAMA*-50™ is pin- and outline-compatible with the Percom System-50™ bus, the SS-50A (SS-50) bus and the SS-50C bus. The composite video-sync signal output will directly drive a color (or BW) video monitor. The output may be modulated for operation with a standard (NTSC) TV set. A modulator is not included. The COLO*RAMA*-50™ card occupies 8-Kbytes of memory in the upper half of a 64-Kbyte memory space. Included on-card is 1-Kbyte of display RAM which will accommodate alphanumeric displays, semigraphic displays and two low-density full-graphic displays. For the higher density graphic displays, additional display RAM is required. The optional RAM ICs may be installed on the card.

For quality Percom SS-50 bus products, see your nearby authorized Percom dealer. To order direct, call **toll-free, 1-800-527-1592.** Prices and specifications subject to change without notice. Prices do not include shipping and handling.

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Toll-Free Order Number: **1-800-527-1222**

PERCOM

Does timesharing on a small system make sense? It does with OS-9 Level One!

Now two (or more) acts can share your microcomputer stage. You will no longer have to walk away from your computer while it is busy running a long program. Because OS-9 is a multitasking operating system, you can be running a BASIC program while editing a PASCAL program, for example. This lets you make more efficient use of your time and your system, even if you only use one terminal. If your application requires multiple, independent terminals, one OS-9 system can do the work of several single-user systems.

The convenience of an advanced operating system

Sophistication does not require complexity. Many OS-9 users say that it is actually easier to use than the older 6800-type operating systems. Consider how easy it is to run multiple programs: to run a program you just type its name and hit 'return.' To run a program as a separate job, you type its name, an '&' character, then hit return. The program runs as usual, but OS-9 comes back immediately and is ready for your next command. Simple commands let you see each program's status, set its priority, or abort it.

The file management system has fast, byte-addressable random-and sequential-access files. The tree-structured multiple directory system lets you create separate disk directories for each user, project, or application. Command line I/O file redirection means you specify what device and/or files a program will use when you run it, not when you write it.

Efficiency and hardware versatility

No other operating system can run on such a broad range of hardware: the overall RAM requirement for Level One is 32K to 56K RAM. Memory utilization is superlative because OS-9 lets multiple tasks "share" the same reentrant program. For example, if two users run BASIC09, only one "copy" is actually loaded into memory. The Level Two version of OS-9 can utilize up to a megabyte of memory on systems having memory management hardware (both versions come with complete timesharing support).

OS-9's device independent I/O system can handle almost any number and combination of I/O devices: five or eight inch diskettes, winchester disks, disk cartridges, serial and parallel ports, memory-mapped video displays, and more. Microware offers a large selection of "stock" device interface software modules, or you can create your own: all the information you need is in the manuals.

Excellent support and documentation

Each OS-9 package comes with a User's Manual and a System Programmer's Manual that cover every aspect of OS-9. If you have special requirements, you can even purchase the Source Code for most of OS-9 and related software. At Microware we take pride in offering the best customer support in the business. Technical advice and assistance by phone, mail or telex is available during all business hours.

Superb software tools

In addition to BASIC09, Microware offers: PASCAL, Interactive Assembler, Macro Text Editor, Stylograph, Word Processor, Interactive Debugger, and coming soon, COBOL, and C language compilers.

BASIC09 has a dual personality. One craves meat-and-potatoes BASIC. The other prefers Programme ala Pascal.

Some people say BASIC09 is really a PASCAL in disguise, others say it's still BASIC. You'll understand this delightful dilemma when you look at both versions of the "bubble sort" program shown below: both can be run by BASIC09. The program on top is unstructured and hard to understand, but it's traditional BASIC. The program on the bottom is well-structured and easy to follow, a virtue of PASCAL. With BASIC09 you can program either way, or mix the best of both. It's like getting two languages for the price of one.

SORT AN ARRAY
IN ASCENDING SEQUENCE

```
90   DIM A(5)
100  I=5
110  IF I=1 THEN 200
120  FOR J=1 TO I-1
130  IF A(J)<=A(J+1) THEN 170
140  T=A(J+1)
150  A(J+1)=A(J)
160  A(J)=T
170  NEXT J
180  I=I-1
190  GOTO 110
200  RETURN
```

```
DIM array(5)
outer=5
WHILE outer>1 DO
  outer=outer-1
  FOR inner=1 TO outer
    IF array(inner)>=array(inner+1) THEN
      temp=array(inner+1)
      array(inner+1)=array(inner)
      array(inner)=temp
    ENDIF
  NEXT inner
ENDWHILE
RETURN
```

Makes programs better

BASIC09 has five kinds of loop structures: WHILE . . DO, REPEAT . . UNTIL, LOOP . . ENDLOOP, FOR . . NEXT and IF . .THEN . . ELSE. If one of the five built-in data types (byte, integer, real, string, and boolean) doesn't suit the problem, you can make a new one of your liking with the TYPE statement. Need a tree, linked list, or symbol table? Complex non-rectangular data structures using any combination of data types are easy to define. Modular programming breaks down large programs to smaller, more manageable elements. BASIC09 or machine language recursion plus parameter passing to any other BASIC09 or machine language procedure. There is a complete set of statements for device-independent sequential or random I/O, plus a superlative PRINT USING system.

Makes programs faster

No full-feature BASIC for any 8-bit microprocessor is faster than BASIC09, because it is an interactive compiler. As each program line is entered, it is instantly compiled to a smaller, faster form. Because BASIC09 automatically converts programs back to original "source" form for listing, it is as friendly and easy-to-use as traditional interpreter BASICs. Each procedure can be independently compiled to position-independent, reentrant, ROMable format. Microware developed a new ultra-fast 9-digit-accuracy floating point math system just for BASIC09. And if that's still not fast enough, there's BYTE and INTEGER arithmetic.

Features that make programs easier to write

The compiler is integrated with a full-feature string AND line-number oriented text editor. If you make a mistake, BASIC09 tells you instantly. String-oriented commands such as search, change, change all occurances, delete, and insert can be used on programs with or without line numbers. There's an automatic line renumbering function too.

Features that make programs easy to test

Debugging often takes longer than writing a program. That's why BASIC09's integral high-level debugger sets it apart from all other compiled OR interpretive languages. The TRACE command shows you each statement executed in BASIC form, plus the result of any expression evaluation. STEP lets you run one or more statements at a time. LET and PRINT allow you to examine or change the values of variables, by name. STATE lists procedure calling order. And there are nine other debug commands. If you need to correct a program, you can edit, recompile, and rerun it in seconds.

Microware software is available for most popular 6809 computer systems.

Write or call for our free catalog. We accept phone orders and MasterCard and VISA orders.

OS-9 is a trademark of Microware. BASIC09 is a trademark of Microware and Motorola.

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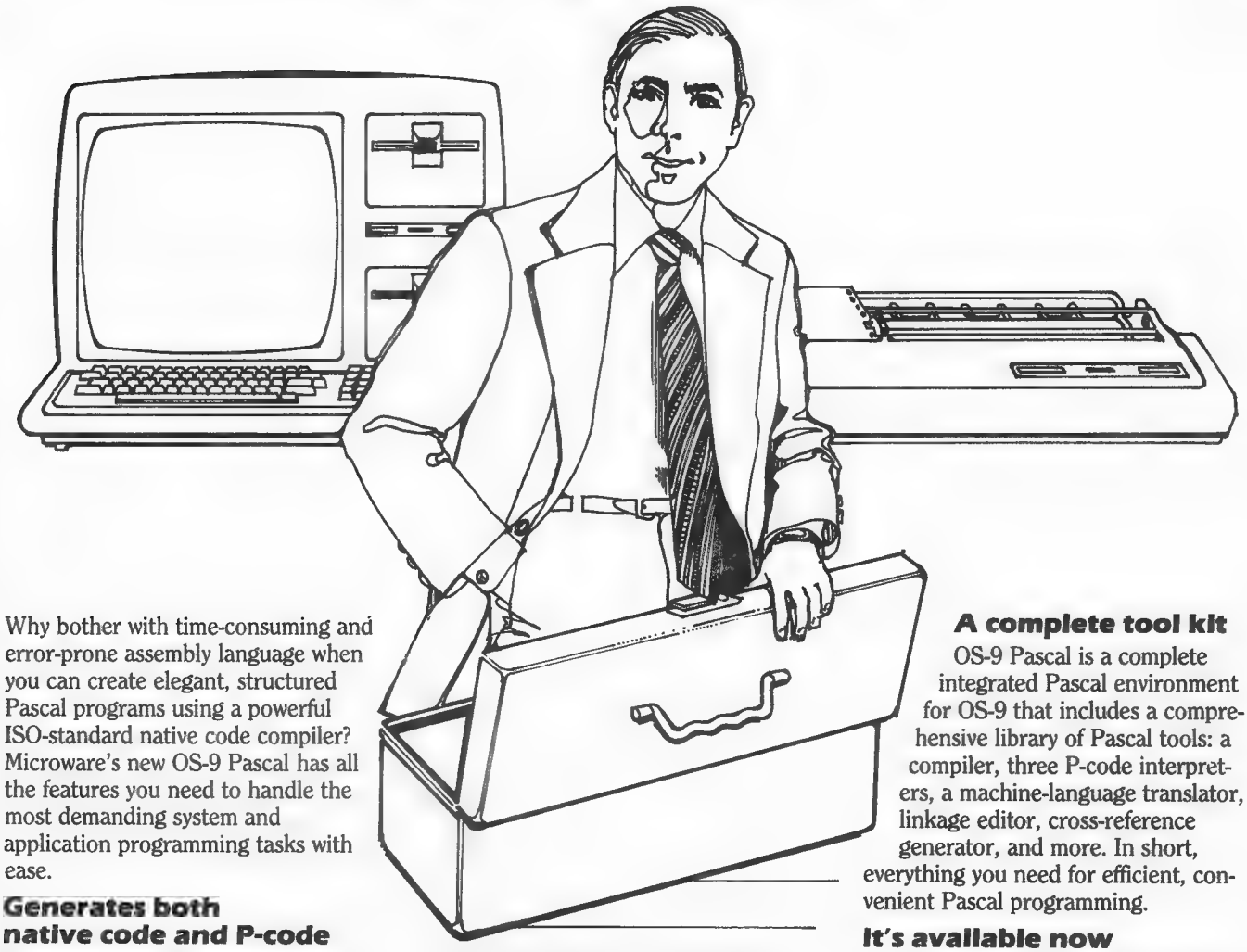
OS-9 PASCAL™:

A New Programming Tool For Experts



Why bother with time-consuming and error-prone assembly language when you can create elegant, structured Pascal programs using a powerful ISO-standard native code compiler? Microware's new OS-9 Pascal has all the features you need to handle the most demanding system and application programming tasks with ease.

Generates both native code and P-code

With OS-9 Pascal you don't have to make that difficult choice between easy-to-use P-code Pascal or fast native-code Pascal. You can compile your Pascal program to pure 6809 assembly language source code. OS-9 Pascal performs extensive local and global code optimization which results in incredibly fast and compact machine language programs. Or if you prefer, OS-9 Pascal can generate P-code for interpretive execution to simplify program debugging and testing. There's also a Virtual Memory P-code Interpreter that can run huge Pascal programs that other microcomputers can't touch. In fact, you can run programs using any combination of P-code, compiled machine language, or handwritten assembly language procedures.

ISO Standard Pascal Plus

OS-9 Pascal conforms to the ISO industry standard for Pascal, so you are assured of portability to or from any other computer that uses standard Pascal. OS-9 Pascal protects your software investment and gives you access to a vast body of existing Pascal software. Beyond the standard, we've added natural extensions to OS-9 Pascal to make it even more versatile, such as: relaxed identifier syntax; separate procedure compilation; random access file and interactive I/O; bitwise logical operators; runtime error handling; and much more. And because it runs under OS-9, it is inherently multiuser and multitasking.

A complete tool kit

OS-9 Pascal is a complete integrated Pascal environment for OS-9 that includes a comprehensive library of Pascal tools: a compiler, three P-code interpreters, a machine-language translator, linkage editor, cross-reference generator, and more. In short, everything you need for efficient, convenient Pascal programming.

It's available now

OS-9 Pascal is now available *off-the-shelf* in all OS-9 disk formats. It can be used on any disk-based 6809 computer running OS-9 Level One or Level Two. Each OS-9 Pascal package includes the compiler, machine language translator, P-code interpreters, runtime support packages, linkage editor, demonstration programs, and a comprehensive 120-page User's Manual.

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(Continued from page 5)

rmation about each device. Among other things this table contians, for each device, a byte indicating which bit(s) is the busy/ready bit and another byte indicating whether "ready" is a 1 or a 0. Changing this latter byte may be all that is required to get your printer working.

Jim Howell
5472 Playa Del Rey
San Jose, CA 95123

Dear Jim,

I appreciate the letter, since I didn't answer all of your questions in the other article. I hope that this answer, along with the OS9 Exchange column will help.

Microware does not supply "instructions" for writing I/O drivers, and does not even supply source unless you purchase it. The one thing that you should remember,however, is that almost all of the existing software may be changed with the debug program to run the terminal, etc. to non-standard I/O addresses. The TMODE command is easily used to modify where the terminal resides and the protocol defaults. I'm sure that you will be able to perform these modifications once you have a copy that you can boot-up with. It may be that a standard system will have to be used to bring up the original version, and then make a modified "master" for you to use from then on.

As far as the file to automatically read commands from, this is already available and running with the "STARTUP" file. In fact, one disk I use boots up with BASIC09 as part of the "boot" and the modified modules along with it. At present, I don't use a particular application program often enough to boot directly into that, but it surely is possible. The TMODE modifications or other module updates are possible to be loaded in with the STARTUP file or a new bootable disk may be made to include the newest modules as part of the boot.

We have received the source for the printer module to see if anything can be done to make the printer work, but so far, even with a lot of help from Microware we have not solved the printer hang-up. I can now make it print a line by pressing the feed button [which dumps the buffer], but it will not print by itself yet. We have come to the conclusion that the printer may need the modification, rather than the software.

Editor

New Products

30M BYTE 8-INCH WINCHESTER DRIVE

Smoke Signal Broadcasting, manufacturers of computer systems based on the 6800/6809 processors, has introduced the latest addition to the CHIEFTAIN Series of computer systems. Designated the *CHIEFTAIN 98W30* - this newest addition to the higher end of Smoke Signal Broadcasting's business computer line houses a 30 Megabyte 8-inch Winchester Disk Drive.

The new systems, the CHIEFTAIN 98W30, is configured around the state-of-the-art 6809 microprocessor allowing programs to run at twice the speed of any other similar system. The excellent accuracy and speed of this 30 Megabyte drive, along with the DCB-4A Double Density Controller Board lends the CHIEFTAIN 98W30 a truly industry-standard title.

A wide range of programs are available for the CHIEFTAIN 98W30, including OS-9 Level I and Level II Multi-user, Multi-tasking Operating System. A standard CHIEFTAIN 98W30 incorporates 32K of RAM - expandable up to 1 Megabtye for specific requirements such as OS-9 Level II. The CHIEFTAIN 98W30 supports an 8-inch floppy disk drive for 1 Megabyte of back-up storage. A 20 Megabyte tape streamer option is also available.

The List Price for the CHIEFTTAIN 98W30 is $9995.00 and delivery is 30 to 45 days from order date.

CONTACT: Jim Allday, National Sales Manager or Deborah Conrad, Manager, Dealer Sales and Support, Smoke Signal Broadcasting, 31336 Via Colinas, Westlake Village, Ca. Telephone: (213) 889-9340.

SOFTWARE VENDOR DIRECTORY

The 5th Edition of the Software Vendor Directory by MicroServe, Inc. has just been published. As always it is a complete revision from the previous edition.

There are now over 1500 software vendors listed (Edition 4 had 1001). There are now 9000 software products listed (Edition 4 had 4000). There are 250 software categories listed (Edition 4 had 200). There are 110 hardware and operating system vendors indexed (Edition 4 had 80).

There are no game applications listed in the Directory. Product listings are limited to systems software, (operating systems, compilers, languages, data base managers, development tools, utilities, etc.) applications, (industry, business, professional, scientific, edu-

cational, etc.) plus catalogs books, and systems which support graphics, sound and plotters.

There are four sections to the Software Vendors Directory.

Edition 5 of the Software Vendor Directory is available at $57.95 per copy or at $100.00 for Edition 5 plus Editions 6 & 7 in March and October 1982 under the Subscription Service Plan.

Orders are accepted by telephone (914) 358-1340 or by writing to:

MICRO-SERVE, INC.
P.O. Box 482
NYACK, NEW YORK 10960

SING 'N STEREO

Speech Systems, manufacturer of the *Speak 'N Sing 1* and the *Speak 'N Sing 2* speech synthesizers, is proud to announce the *Sing 'N Stereo* music and sound effects synthesizer. Each channel features an 8 bit D/A converter, seperate tone and volume controls, a low pass audio filter, and an on-board audio power amplifier that easily drives an external speaker.

Supplied software includes single and four voice music selections as well as several sound effects. Also included is a music compiler that allows one to easily develop single voice music. Available separately is a four voice stereo music compiler. The *Sing 'N Stereo* sound effects and music synthesizer is priced at $69.95 and the ME-1 four voice stereo music compiler is available for $39.95. All software is available in FLEX 2.0 or 9.0 formats and comes on 5¼ or 8 inch disks.

For further information call or write: Speech Systems, 38 W 255 Deerpath Road, Batavia, IL 60510, (312) 879-6880.

PRICES REDUCED

Harold Mauch, president of Percom Data Company, today announced major price reductions in the company's System-50 modules and devices.

Percom System-50 products are compatible with the SS-50 bus, a 50 pin bus supported by several manufacturers and used widely for 6800 and 6809 based personal computers.

Mauch said the new low prices are the result of decreasing chip prices and Percom's capacity for volume component purchases.

Mauch said the new low prices allow a person to get started in computing with an expandable, bus-oriented system for less than the cost of many one-board computers.

The SBC/9, a single-board computer/System-50 MPU card, now sells for $139.95. The SBC/9 sold for $199.95 before the new price announcement.

Percom's system-50 video display controllers, the *Electric Window* for black and white displays and the *Colorama-50* for color displays, have each been reduced $80.00 to $169.95 and $139.95, respectively.

A Percom LFD mini-disk system, which includes four-drive controller, disk-operating system, the drive mechanism itself, inter-connecting cable and documentation, is now $459.95, a reduction of $140.00.

Prices of most other System-50 products, including memory cards, have also been substantially reduced.

Percom System-50 hardware, software and accessories may be ordered directly from Percom. The toll-free order number is 1-800-527-1222.

COMPUTERWARE'S PAC ATTACK

Computerware introduces its PAC ATTACK game on cassette for the Radio Shack Color Computer.

Computerware brings the fun of the arcades to your Color Computer with the new PAC ATTACK game. Three little muggers chase your man relentlessly around a maddening maze as you furiously try to build up points. This game's great graphics and sound effects offer continuous action at three levels of difficulty for computer buffs of all ages.

PAC ATTACK costs only $24.95 plus $2.00 SIH and is available directly from Computerware at Box 668, 1472 Encinitas Blvd., Encinitas, Ca. 92024, (714) - 436-3512.

COLOR COMPUTER BOARD

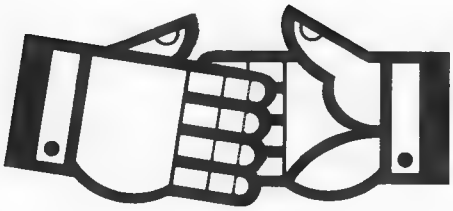
Compuware has introduced a new board that expands the memory of the Radio Shack Color Computer from 16K to 32K.

Computerware's *16 PLUS BOARD* does *not* require soldering, plugs in easily, and fits neatly under the RF shield cover inside the computer. Complete installation instructions are included with the board.

Computerware's exclusive design allows the graphics display to reside anywhere within the 32K of memory. No software modifications are required for existing software and the *16 PLUS* makes your Color Computer completely compatible with the anticipated disk systems.

The *16 PLUS BOARD* costs only $84.95 plus $2.00 SIH and is available directly from Computerware at Box 668, 1472 Encinitas Blvd., Encinitas, CA 92024, phone (714) 436-3512.

[SS-50]



OS-9 EXCHANGE

By Ken Orme and Gary Manning

In a recent issue, we talked about BASIC09 and covered some of the features, timings and other phases. We will cover the random files this time, since most of the work that we have done has been with them.

BASIC09 has both sequential and random access files available. In order to use them, you must first CREATE a file. This BASIC allows you to create files with the word CREATE. The one thing that makes OS-9 slightly different from other BASIC's in the file department, is the use of a single file type that may be accessed either sequentially or at random. The files are expanded automatically by the PRINT, WRITE or PUT statements.

As with almost all other file handlers, you must OPEN an OS-9 file before you read or write from it. There are essentially three access modes to choose from; READ, WRITE, or UPDATE. Since the first two are self-explained, the last one means that it may be used to either READ or WRITE.

Since we are talking mostly about the random-access features of BASIC09, about all we need to remind you of with the sequential portion of the system is that it is about the same as all other sequential systems as far as access and handling are concerned.

However, data is stored in sequential files in ASCII form with a carriage return as the record delimiter after each WRITE command. Data is retrieved from a sequential file by the READ command which returns a variable length record from the current file pointer to the next carriage return. The SEEK command is used to change the value of the file pointer and is usually only used with sequential files to perform the equivalent of a "rewind" (SEEK# path, 0). Since data in sequential files is stored in ASCII, it tends to be large and transfer is more slowly than in random files which use binary representation.

Data can be stored in random files as structures, elements of structures, or bytes. Since computing the size of complex data structures can be very error-prone, a function called SIZE can be used which returns the size of any structure, array or variable. SIZE can be used in conjunction with SEEK to locate a specific record. SEEK#path,(N-1) ☆ SIZE(names) would set the file pointer to the Nth record of a file called "Names". Data is written to a random file with the PUT statement and read by the GET statement. Since I/O devices are treated as files, files on magnetic media may be printed or displayed and updated via file transfers to or from the appropriate I/O device. Another nice feature is that as long as there is available RAM, open files (or at least as much as will fit) will be kept in RAM until they are closed. This helps to avoid the mechanical wear and time delays of having to access the disk or tape for each read or write to a file.

The user's guide gives fairly good examples of the syntax and how to use the files. As with most manuals, this area leaves a little bit to be desired, however. The access to a random file is very fast as we have seen on program reading random files and displaying them at about 6 per second. Staying away from the "linked list" form of random access speeds things up and is very reliable.

OS9 VERIFY REPORT

Last issue I mentioned that the verify utility in version 1.1 may not be functioning properly. As it turns out, it was my thinking that was not functioning properly. I tried to use the verify the same way as version 1.0. However, the main difference is that verify assumes the standard input (terminal) and the standard output (terminal) unless modified. In order to verify a file named TEST and have it output to a file called TEST1, the following command should be entered: VERIFY TEST TEST1 U. The "U" tells verify to automatically update the file

CRC and header before writing the new file. Since the last article, we have used VERIFY many, many times and had it function properly. One of the tings that had us thinking it wasn't working is in version 1.0 you could verify a module in memory. With version 1.1 you must have the module saved first. The way to update or modify a module is to use Debug to modify it, save the module on disk, then use verify to update the program. You will most likely have to use the ATTR (attribute) command to change the file so you can execute it. Also, in order to insure that the newest version of a module is used is to change the version number (byte $07) to a higher one. Then once the latest version is loaded into memory, it will be the one that will run, rather than the older version.

Interactive Debugger

Without the Debugger, those of you who desire to change or modify programs will feel as though you are handicapped. The Debugger is worth purchasing for anyone who works with OS9 more than casually. In a nutshell, it may be used for memory access, testing machine language programs, verifying memory and other such memory access tasks. It becomes for OS9 what a monitor program does for other disk operating systems.

One nice feature of OS9 is that the programs have prompts that let you know which one you are in. The Debugger is no exception, using "DB:" as the prompt. As with other programs, you may use upper or lower case characters. One of the most powerful features is the ability to interpret expressions. Most expressions may be written similar to those used in BASIC, with a few special operators and operands unique to the Debugger.

The operators available include addition, subtraction, multiplication, division, logical AND, logical OR, negate, and logical NOT. There are some special names for registers: Accumulator A, Accumulator B, Double Accumulator, X Register, Y Register, U Register, Direct Page Register, Stack Pointer, Program Computer, and the Condition Codes Register. Also used and a necessary part of the Debugger is "Dot", represented by ".". Dot is simply the debugger's current working address in memory. Typing "." will cause the current value of dot and the contents of that address to be displayed. Typing just a return increments Dot and prints its new value. To decrement dot, simply type a minus sign and a return, which decrements dot one step at a time. To change dot, you need only to type a period followed by an expression which is the new value of dot. To change the value in the memory location of dot, simply type an equals sign followed by an expression. The expression is evaluated and then the value of the expression is stored in dot. Also, if dot is changed, the last value of dot is saved and may be displayed by typing two periods.

The calculator mode may be entered by typing a space, followed by the expression to be calculated. In this mode, you may look at memory without changing dot, simulate 6809 indexed or indexed-indirect instructions. Conversion from decimal to hexidecimal, binary to hexidecimal and back may also be performed.

The register command allows you to examine one or all registers and change the register contents.

The breakpoint command allows you to set breakpoint addresses or to kill them.

Most programmers enjoy commands to display blocks of memory so that the porgram or module may be displayed on the terminal or printer. Debug allows this function much like a monitor program. That is, by typing M followed by the starting and the ending addresses, the memory is displayed on screen with the hexidecimal values first and then the ASCII equivalent to the right. Two other commands are also quite useful. The search memory feature allows you to look for a one or two-byte value, beginning at your current (dot) location to the ending address specified. The third command performs a "walking bit" memory test between the addresses you specify. Any bit failing the test will be displayed.

There are several OS9 related commands available with the L or LINK command being the nicest one. With it, you are able to link to the module you specify in the command line. This saves a lot of time trying to find the module by simply advancing "dot" through memory. The dollar sign tells the Debugger to pass the rest of the command line to the shell, allowing such things as directory listing and utility programs to be run, returning to the debugger afterward. Also, by typing a $ and then a return, you go back to the shell until an escape is entered, which then returns you to the debug program.

The execute command allows you to combine the debugger with a program, and even allows program execution by typing a "G".

Overall, there is little that the Debugger lacks in capability. About the only thing I really miss is a disassembler. It could be part of the Debugger or a seperate module, but would be a nice addition. If you purchase OS9, you will surely want and need the Debug program.

[SS-50]

PERCOM Peripheral

Garland, Texas No. 7

WHERE HAVE ALL THE COMPUTER KITS GONE?

by Harold Mauch

I like to visit computer stores and listen to the questions of customers.

Some ask about a common fruit; others ask about the health of a deceased gentleman from Fort Worth.

A few ask for a computer they can build themselves.

"I'm sorry," they're told, "but we don't carry kits any more. Too much hassle."

"If you like to experiment, we have a gee-whiz dandy Chroma Dazzler that can speak 16 languages, maintain 32,768 recipes, schedule 65,536 appointments and balance your checkbook.
And you don't even have to know how to program. We're offering this little gem today for just $1,999.99, and that includes disk storage."

Just $1,999.99?

Many a computerist bought a SWTP or other SS-50 computer because of the processor. Or because they enjoy building kits. But I suspect more than a few bought kits because it was the one way they could afford to own a computer. No doubt there's a substantial market for computer kits. So why aren't there more computer kit manufacturers?

I think I know the answer.

The fine efforts of SWTP not withstanding, much System-50 hardware and software came out of the spare bedrooms, garages and basements of fledgling, but determined entrepreneurs.

Let's suppose you want to become just such an entrepreneur, and in the process maybe we'll find the answer to the question about the scarcity of kit vendors.

You decide to get into the computer kit business. Why kits? Well, you can't afford to start up an assembly operation. Besides, you honestly want to give prospective customers the lowest price possible. A

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GENERAL INTEREST

Double-Density Adapter for System-50

Many people have asked if our double-denisty adapter, which we developed for the TRS-80☆ computer, could be used with the SS-50 bus disk controller. Unfortunately, it is *not* a simple plug-in-and-run situation for either the Percom or SWTP controller. However, the Doubler, as the Percom TRS-80☆ double-density adapter is called, can be easily connected to the older Smoke Signal controller. Dale French, one of our System-50 technical specialists, is working out the details for connecting the DOUBLERtm modifications along with the OS-9 driver in the next issue of the Peripheral.

price 15% above cost seems reasonable.

Design through hardware prototyping is easy. After all, you *are* a senior designer -- at TI no less. You do a little fine-tuning of the design and get prototypes made. Now the fun begins.

A small ad in Byte and a small stock of kit parts wipes out most of the family savings. You confidently reassure your wife, however, and together you wait for the orders to roll in.

Meanwhile, you hawk a few kits to members of the local computer club. And spend the next several weeks solving their individual problems -- cold solder joints, wrong capacitor polarities and owner design "Improvements" that don't work.

Finally your ad appears in Byte. You soar like an eagle. (Hon, we're gonna be rich!)

You resist the urge to buy up all the new Byte magazines at the local computer store, limiting yourself to a mere 10 copies. Of course mother back in Toledo gets one. (Look Ma, I've got my own business!

The Byte ad makes you an instant expert, so naturally you're invited to give a demo at the next computer club meeting. Is this the beginning of fame?

By now the ad has been out a week. You've had a few callers (keep that damn dog quiet while I'm on the phone!), and a few people have written for more information. (*More* information? Good grief, the ad copy took two days to write and gives everything but the length of the heat sink bolts.)

Never mind. You take the Byte ad, and with the help of your wife's thesaurus, grind out a data sheet. You include specifications for the heat sink fastener.

Before long the postman is delivering your bills in a basket: an invoice for the data sheet printing, a Byte invoice for the next ad insertion, a phone bill that infuriates your wife (Hon, call the phone company, I know I didn't make *that* many long-distance phone calls.), and so on.

Your boss at TI is beginning to make snide remarks about the lagging status of your work project. But these are trifles compared to the next bomb?: a design flaw in the kit! (Oh, my God! How can I face the computer club again.)

You design out the flaw but can't ship because the new IC for the fix isn't available. The complaints begin. "Whereinhell's my kit -- you promised it four weeks ago."

One irate customer wants his money back. Another demands to know why the users manual doesn't explain how to use the product with his home brew 4004 machine. Both promise scathing letters to Byte, the Better Business Bureau and their congressmen. (God, my gut aches.)

The new ICs finally arrive. Your wife calls you at work to tell you the UPS driver won't take a personal check. (Cashier's check or money order, please.)

You tell the boss that son #2 seems to be having an attack of appendicitis, and must be rushed to the hospital. Than you rush to the bank, withdraw $475 from the wife's Christmas Club account and race to the house. Wife suspects, but you jump back in the car before the questions start. Back at work you tell the boss it was a false alarm, "The little nipper just ate too many fresh cherries, heh, heh."

More than a few long-distance callers, saying they weren't about to buy a pig-in-a-poke, want to know the whereabouts of dealers in their area. So you decide to line up dealers.

The first dealer doesn't have the courtesy to say goodbye when you suggest a dealer cost of 5% off retail. Neither does the second dealer, the third, etc. You soon learn that retailers expect--indeed need-- a 35% mark up. Or thereabouts.

You call an old college friend, one who switched from engineering to a business major, and plead your case. After he stops laughing (why did I tell him we price at 15% above costs), and after discussing cash flow and return on investment, he offers to help -- for a piece of the action. (Maybe these business majors are really the smart ones after all?)

At any rate you raise the price and start calling dealers again. Now the price is OK, but the dealers won't carry kits: too much hassle. (No fools, these dealers.) So willy-nilly, you get into the business of assembling electronic modules. You start slow. Boy, do you start slow -- one employee, an ex-TI assembler needing part time work, a soldering iron and flux, a solder sucker and a few hand tools. The lady assember is competent: her only question concerns getting paid. Nothing serious.

In the unlikely event (as you tell yourself) that you can't "meet payroll," you decide to seek a bank loan. Bankers make unsecured loans about as often as smog-free days occur in Los Angeles, so you pledge your car, the house, a quart of blood and a pound of flesh--but get the loan.

You meet the payroll, i.e., you pay the lady assembler. She smiles, looks at the check, frowns, shrugs and disappears forever. You're out of the assembly business.

It's time, you decide, to sit down and take a real hard look at the business. You call a buddy, a fellow industrialist of kindred interests, and together do a (sound of bugles, roll of drums) COST ANALYSIS. All things considered -- parts bagging errors, solder bridges, troubleshooting over the telephone and letters, letters, letters -- you conclude that...

Kits cost more!

And that, weary reader, is the bottom line. It costs more to produce, market and support kits (with the

emphasis on support) than it costs to produce and sell assembled and tested units.

It is enlightening, in this respect, to compare the price of a Heathkit color TV kit to the price of a comparable RCA, Magnavox or Quasar set. There's little difference. Yet, the customer will always insist that kits be priced substantially lower.

Unfortunately -- for those of us who would rather build a kit -- few kit suppliers become very successful. And it appears that we will be getting those few kits that are available from a UPS delivery man, after placing a long-distance call that's answered from a phone in a bedroom or garage.

OF INTEREST -- Harold Mauch, president of Percom Data Company, recently announced that Percom and Access Unlimited, a computer retailer, have agreed to join in a cooperative venture which will make Access Unlimited a retailer of Percom System-50 (SS-50) products.

Access Unlimited is a Richardson, Texas-based mail-order and direct sales retailer of computer-equipment, software and parts.

Manufacturers and software vendors other than Percom also will be contacted.

The program calls for Access to become one of the largest, if not the largest, integrated, full-line source of 680X products for the sophisticated System-50 market place.

Interested suppliers can reach Access Unlimited at:
401 N. Central Expressway #600
Richardson, Texas 75080
(214) 690-0206

NEW PRODUCTS

Although this section usually features new System-50 hardware and software products, in this issue we would like to mention two computing "Accessory" items that we have carried for only a short time but which are proving to be very popular.

System Desk, Printer Stand --Custom-designed to Percom specifications, this system of low-cost computer furniture organizes your computer station into a compact, convenient arrangement of accessories and peripherals.

☆ Furniture quality styling and finish.

☆ Modular design lets you customize to paricular needs.

☆ Units knock down for shipment -- delivery is right to your door.

☆ Snap-locking fasteners -- no tools required for reassembly.

System Desk

The under-desk module accommodates either one or two drawers, and can be located either to the right or to the left. The drawers, which are on ball-bearing rollers, have a full-width opening in the rear for equipment cabling.

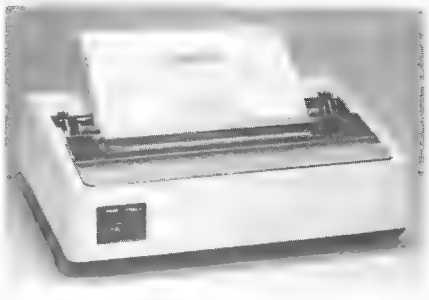
The riser shelf can be used to support a display unit, hold reference manuals, etc. The riser also can be positioned either to the left or to the right.

Printer Stand

The under-desk module plays a dual role, serving either as the desk bay or, with an optional top added, as a printer stand. With the top in place, the printer stand and desk are the same height.

Specifications --The desk is 48" wide, 24" deep and 26-½" high (typing height). The riser is 23" wide and 11" deep. The riser shelf can be at 7-½" or 11" above the desk top. The desk bay inside dimensions are 16" wide by 16" deep by 10½" clearance height. The printer stand (under-desk module with top in place) is 24" wide by 24" deep by 26-½" high. Finish is wood and durable plastic laminate.

To order or for additional literature, call toll-free 1-800-527-1222.



Microline 80 Printer

No other serial dot-matrix printer has so many features for the price:

☆ Prints upper and lower case characters in standard-condensed- and double-width faces.
☆ Prints block graphic characters.
☆ Alphanumeric characters are in easy-to-read 9x6-dot matrix format; graphic characters are 6x12 dot.
☆ Font selection and line spacing are programmable.
☆ Prints 80 cps with no duty cycle limitation.
☆ Print head is warranted for 200,000,000 impressions the equivalent of over nine years of microcomputing
☆ Handles cut sheets, roll paper and fan-fold pin-feed stock. Optional snap-on tractors are available for other forms.
☆ Standard interface is parallel, Centronics compatible. Optional serial interface available.

☆ The Microline 80 is rugged (cast aluminum base), lightweight, quiet and dependable. And **inexpensive.**

To order or for additional literature, call toll-free 1-800-527-1222.

Editors Note-

A supplement to the Peripheral is available from Percom Data Company. The supplement includes more specific information - - for example, additional notes on product improvement and maintenance. This supplement may be obtained from Percom by calling our toll-free order number, 1-800-527-1222. From within Texas, call (214) 340-7081.

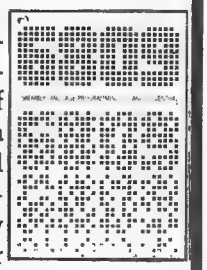
TRADEMARKS APPEARING IN THIS ISSUE OF THE PERIPHERAL:

PERCOM is a trademark of Percom Data Company, Inc.
TRS-80 is a trademark of Tandy Radio Shack Corporation which has no relationship to Percom Data Company.

BE SURE TO MENTION SS-50 COMPUTING WHEN CONTACTING ADVERTISERS

SS-50 Bookstore

6809 Assembly Language Programming

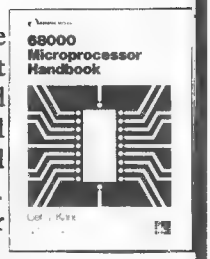


This book presents a thorough introduction to assembly language programming and a complete discussion of the 6809 instruction set. It starts at a very basic level and builds into actual programming techniques, I/O structures, and hardware interfaces. By Lance Leventhal. 530 pages. Order No. 357 $16.99

6809 Microcomputer Programming and Interfacing/Experiments

This book is written to give sound information on how to program and interface the 6809-the high performance 8-bit microprocessor. It contains seven chapters and four appendices and is valuable as a "cookbook" aid when working with the 6809. By Andrew Staugaard, Jr. - 304 pages - Order No. 21798 $13.95

68000 Microprocessor Handbook



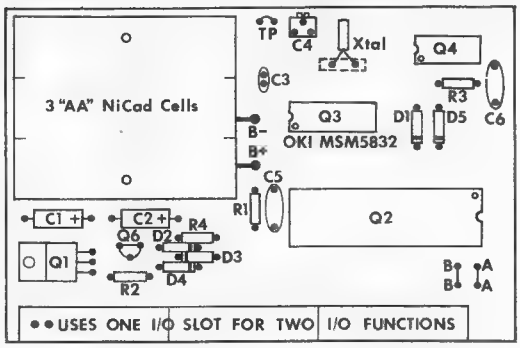
This handbook gives a complete comprehensive picture of the 16 bit 68000 microprocessor, its timing, and special features. Also, several practical application problems and discussed and it is compared to other 16 bit devices. By Adam Osborne - 220 pages. Order No. 411 $6.99

MC6809 Cookbook

This cookbook explains the basic operation of the 6809 and the 6809E microprocessors. Everything from the timing and clock information to the instruction set are covered. By Carl D. Warren - Order No. 1209 $6.95

Orders should include title and order no., along with check, m.o., or VISA -Master Card info. - Mail to: SS-50 Computing Bookstore, P.O. Box 398, Garland, UT 84312. Include $1.50 per book for shipping and handling. Please allow for personal checks to clear. Sorry, no COD's. Foreign orders should include $7.00 per book shipping.

Model 6800CL4 CalClock/TIMER



IT'S A HARDWARE CALENDAR/CLOCK

- Keeps date and time without servicing by the computer
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WITH AN INTERVAL TIMER INCLUDED

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Fully assembled & tested*	$ 99.95	5" Disk (Flex2☐ Flex9☐)Ⓣ	$ 10.00
Complete kit*	$ 69.95	Goldplated buss connectors	$ 6.00
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* FULLY DOCUMENTED: instructions; diagrams; theory; more than 20 pages of sample software (automatically puts date in Flex2/9Ⓣ date buffer, adds time-of-day to assembly listings, maintains consta nt, current time+date display on top line of CRT). Batteries not included. All IC's socketed.

Ⓣ FLEX is the registered trademark of Technical Systems Consultants, Inc.

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video and audio connector set	15.
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- Can be user configured for virtually any terminal or printer.

$295, manual $15, updates from old versions $180.

STYLOGRAPH 3.0

This version is designed for "tty" printers but is otherwise identical to version two. It does not support specialty characteristics such as superscript, subscript, incremental printing, and proportional printing.

$195, manual $15, updates from old versions $90.

STYLOGRAPH MAIL MERGE

This program takes files of variables, such as names and addresses, and inserts them into a Stylograph text file for automated mail list generation. It will also allow a number of Stylograph text files to be appended at printout time so that page numbers and headings will be continuous in the printout.

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MAGIC SPELL™ is extremely fast and compact. It will run in systems as small as 16K, can correct documents up to ten times larger than available memory, and reads text at a rate of about ten pages per minute. MAGIC SPELL™ is in stock now for Technical Systems Consultants' MiniFlex, 6800 Flex, and 6809 Flex, as well as for Percom Disk systems. OS-9 and SSB versions will be available soon. It is available in two versions:

MAGIC SPELL I is for the general user. It comes with a 10,000 word dictionary, and costs $89.29. This is the version we ourselves use.

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STAR-KITS

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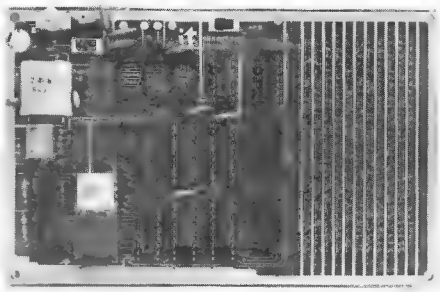

- **Supports the 6801 microcomputer family**
- **Only 4x6¼" including a 4x2" prototyping area**
- **2K Bytes EPROM/2K Bytes RAM/RS-232 Interface**
- **Complete documentation (over 50 pages)**

MC6801 APPLICATIONS PROTOTYPE BOARD

The APB is a small board which supports the MC6801 family of microcomputers. It is described in Motorola's application note AN799. A typical 6801 member contains an enhanced 6800 processor, 2K bytes of ROM, 128 bytes of RAM, a 16-bit programmable timer, parallel I/O, and a serial communications interface. In addition to the resources of the 6801, the APB provides an additional 2K bytes of EPROM (TMS2716), 2K bytes of RAM (2114L), and a full duplex RS-232 interface. It also supports special versions such as the 6801G1 with its LILbug* monitor; and provides on-board programming of the 68701 EPROM version.

The APB is an excellent **educational aid** which allows for evaluation and familiarization of 6801 family members . . . It is great for **prototype development.** Since the 'nuts and bolts' are already in place, the designer need only add the necessary interface circuits for a particular application . . . It can also be used as a simple cost-effective **dedicated controller** for those limited quantity applications.

Besides being so practical, it is a **fun** little board. Order yours today!

* TM of Motorola Semiconductor Products, Inc.

APB-1 Bare board with documentation	$ 19
APB-2 Above assembled with all parts less microcomputer and memory	$ 69
APB-3 Above with MC6801G1 and LILbug manual	$109
APB-4 Above with four 2114L RAMs	$129

For the **SS-30** Bus:
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6809 RECORD MANAGEMENT SYSTEM RMS

DATABASE MANAGEMENT

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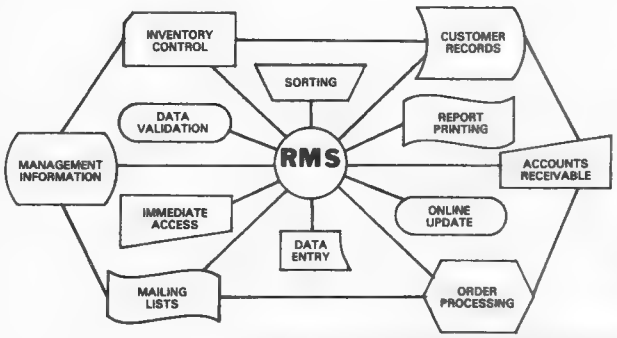
- VERSATILE, PROFESSIONAL QUALITY REPORT WRITER
- BUILT-IN SORT/MERGE
- EASY TO USE

RMS is a complete DATABASE MANAGEMENT package for the 6809 computer. It is made up of five machine language programs that make up the most powerful business programming tool available for the 6809. It can be used by the relative novice, to implement an incredible variety of information storage and retrieval applications, without any programming. However, the programmer can use RMS as part of the solution to a larger problem, saving many hours of unnecessary program development time. RMS can be used to handle data input, editing, validation, on-line retrieval, sorting and printed reports. Custom data manipulation can be filled in by the user's BASIC programs.



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DISASSEMBLERS for 6800/1/9

-analyze (6800/1/5/9&6502) or (Z-80,8080/5)

-easy-to-use, with extensive manual

-includes xref and name-changer

EACH $99

CROSS-ASSEMBLERS

MACRO SETS for TSC 6809 ASSEMBLER

-generate code for 6800/1,6805,6502,Z-80,8080/5

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RUN on 6800/1/9

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-for 6805

-for 6502

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FULL-SCREEN ELECTRONIC SPREADSHEET SYSTEM

-similar to DESKTOP/PLAN (TM Desktop Computing)

$100

6502 TRANSLATOR

-translates 6502 source to 6809 source

-easy-to-use, with comprehensive manual

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FOR XBASIC on 6809, uses terminals and video boards

-forms display generator $50

-mailing-list system (menu-driven, powerful) $100

-inventory and manufacturing $100

TSC BASIC UTILITIES

-xref and resequencer for BASIC, XBASIC, PC, XPC $25

-sort-merge XPC program generator $25

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All programs run under 6809 FLEX - some also run on 6800/1

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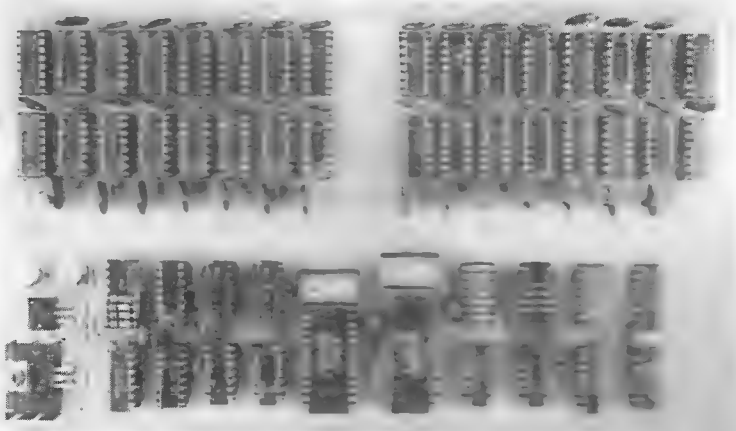

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For The SS-50/SS-50C Bus

- Completely TRANSPARENT Refresh [During 01] at 1 MHz
- Operates with BOTH 6800 and 6809 systems
- Compatible with the 20 bit extended addressing mode.
- Diode Protection On The -5V Power Line
- Memory Selection and Relocation For Testing
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- 4116 Type RAM With 200 ns Access Time
- Printed Circuit Board:
  Double Sided With Plated-Through Holes
  Silkscreen Component Layout On Top Side
  Solder Mask On Bottom Side
  9 inches by 5.8 inches
- Designed around Motorola MC3242A and MC3480 Delay Lines To Ensure:
- NO Timing or Temperature Problems
- NO [NONE] One-Shots
- NO Adjustments

PRICES

OPTION 1 - $80.00	Includes PC Board and 18 Pages of Documentation.
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OPTION 3 - $120.00	Same as Option 2 Plus the Two Memory Contollers
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OPTION 5 - $250.00	Completely Assembled and Tested but Without 4116's

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PHONE [408] 269-9522

Also available - Extender Boards from BOAZ
50 Pin Board - $15.00
30 Pin Board - $12.00

Orders Should Include $5.00 Shipping
California residents add 6 1/2% Sales Tax
Cash - Check - Money Order
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word's worth

P.O. Box 28954
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C COMPILER FOR 68Ø9

Based on SMALL-C as published in Dr. Dobbs by Ron Cain. Transported to DOS69D by Allan Batteiger, adapted to FLEX by Bill Knight. FLEX version requires a special loader (included). Current plans are to produce a full C in three steps: Ver. 1.0 available now; ver. 2.0 - 2nd Q/82; ver. 3.0 - 4th Q/82. Prices to be announced. Liberal upgrade policy. User's guide, binary for compiler, and source for run-time library. 48K system recommended.

For FLEX 9.0 (with loader)	$52.50
For DOS69D	$47.50

RLOAD 3.Ø

Relocating linking loader for TSC's absolute assembler. Enhanced version of RLOAD published in '68' Micro Journal by HL Harkness. Source and documentation on the disk.

RLOAD for FLEX 9.0	$17.50

FIG-FORTH FOR FLEX 9.Ø

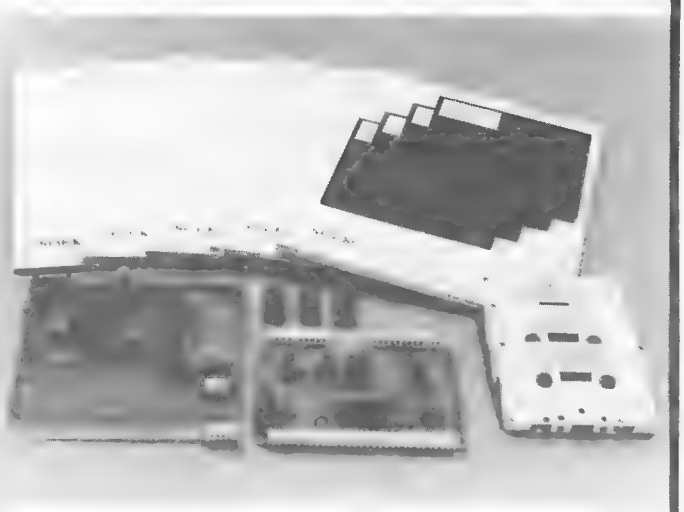
FIG does not supply machine-readable source to their otherwise excellent package. Two disks - (1) Source in FLEX format, (2) FORTH editor published in Forth Dimensions, ('screen' disk). Supplied without comments, except for a few minor bug fixes. Intended to supplement, not replace, the FIG-supplied documentation. Saves about 10 hours of typing. SSB version to be announced.

FORTH for FLEX 9.0 (2 disks)	$19.50

These programs normally supplied on 5" disk. For 8", add $2.00 per disk. Prices good until February '82. Shipping and handling included. Texas residents: add $0.25 sales tax per 5" disk, $0.35 per 8" disk. Specify operating system and disk size. Visa and MasterCard prices 5% higher. Allow 4 weeks for check. Please do not send cash through the mail.

DOS69D is a trademark of Smoke Signal Broadcasting. FLEX is a trademark of Technical Systems Consultants. FIG stands for the FORTH Interest Group.

STAR-KITS



6800 HARDWARE

SBC-02 single board computer uses 6802 with RAM, ROM, I/O. Ideal controller, intelligent interface, and more. Printed circuit board is $25, complete controller kit $75, wired and tested $150. Also available: HUMBUG (see below), Basic in ROM, etc.

CT-PS serial/parallel interface card. ACIA-type interface for RS-232C terminal and/or a parallel keyboard. Makes keyboard look like a terminal with absolutely no program patching. Ideal for video board based systems. Bare board $20, complete kit $55, wired $100.

6800 AND 6809 FIRMWARE

6800 HUMBUG monitor. Totally MIKBUG compatible, plus single-stepping, multiple breakpoints, formatted memory dumps, multiple port control and more. "Fantastic!" say our customers. 2K version $40 on 2708 or 2716 EPROM with source listing. Alternate versions, including video board versions available.

6809 HUMBUG-09 has all the features of 6800 HUMBUG and more. Not just a compatible monitor, but a debugging package and system I/O manager as well. Two ROMs, manual and full program listing for $75. Also available in video board versions.

6800 AND 6809 SOFTWARE

BASIC UTILITY PACKAGE renumbers, pretty-prints, prints variable and transfer indexes, compares, shortens Basic programs. On Percom or miniFlex* disk for $30.

CHECK 'N TAX balances your checkbook, finds errors, prepares income tax data. On Percom, miniFlex*, Flex 2.0* or Flex 9* disk for $40.

SORT-MERGE—the only one for Percom disk systems, sorts even full-disk files. $35.

NEWTALK for your 6800 or 6809 system makes it talk to you. This memory dump utility outputs through a music board or any PIA port. $30 on Percom or Flex 2/9 disk, or cassette.

6800 CROSS-ASSEMBLER written in Basic. Assemble 6800/6802 programs on your new 6809 (or your 370 at work!). Available on 5" disk, KC cassette, or TRS-80 Level II cassette for $9.95.

GAME PACK with Eliza and 3-D Tic-Tac-Toe. 5" disk or KC cassette $15.

Send s.a.s.e. for catalog. For detailed information, buy any manual for $5 and get $6 credit toward purchase. (* is a trademark of Technical Systems Consultants.)

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48K 2MHz STATIC RAM/ROM CARD

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*mix 4K blocks of RAM and ROM
*6800 and 6809 compatible
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*5 volts only
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*gold connectors

Bare Board $49.00 2716 1MHZ $9.95 2016 P-2 2MHZ $16.50

A/T with 16K $250.00; with 32K $375.00; with 48K $495.00

A/T without memory chips $120.00

NEW ACCESSORIES FOR 68XX USERS:

SS-50/SS-50C EXTENDER CARD	$35.00
SS-30 EXTENDER CARD	$25.00
*Both cards assembled with a built in logic aid & gold edge connectors	
SS-30 WIRE-WRAP/PROTOTYPE BOARD (board only)	$20.00
*Pad spacing permits most standard sockets from 8 to 64 pins	
*Provision has been made for voltage regulators	

FEATURED PRODUCT: **SP-1 Bare card $49.00 Asm. + tested $195.00**

*A super prototype board *Card design includes
(3) 6821 6 parallel ports
(4) 6850 4 serial ports
(1) 6840 3 16 bit counter/timers
which are fully buffered and decoded
*Accomodates a mix of 38, 14 & 16 pin wire wrap sockets
*Pad spacing permits most standard sockets from 8 to 64 pins

MODEM CARD	B/C	$ 49.00
special parts kit		$195.00
A/T without extra features		$325.00
*SUPER CPU assembled with source listing without 2K EPROMS (2-2708)		$235.00
*Monitor in two 2708 EPROMS		$ 29.00
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*VIDEO RAM asm. 7x9 chars 64x16		$195.00
*VIDEO RAM bare, doc, Xtal, src.		$ 49.00
*PARRALLEL I/O asm 100 I/O lines incl. 5 PIA's for 10 ports		$139.00
*PARALLEL I/O bare card & doc.		$ 49.00
*SS-50 WIRE-WRAP/PROTOTYPE bare		$ 39.00
*TRANSITION CARD asm.		$ 95.00
*TRANSITION CARD bare		$ 49.00

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*16 position SS-50	$80.00
*12 position SS-50	$60.00
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**Connectors:
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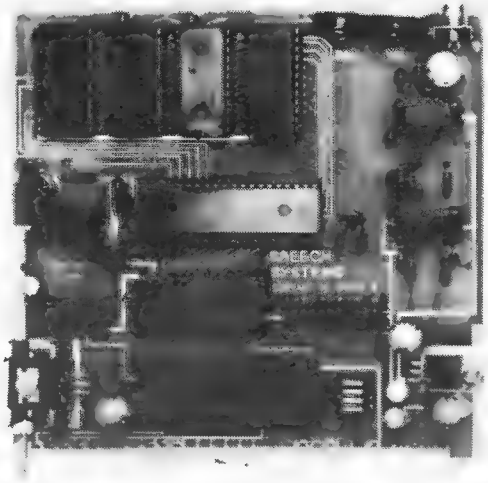
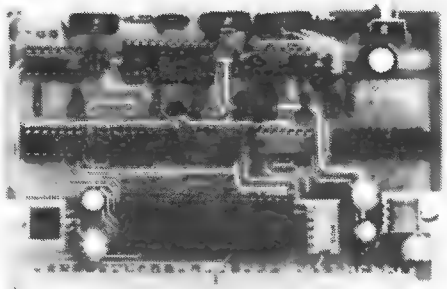
THE GREAT DEBATE

SPEAK 'N' SING 2 vs. SPEAK 'N' SING 1





WHATEVER YOUR CHOICE, YOU WIN
THE MOST VERSATILE SYNTHESIZERS ON ANY BUS

- Both the SPEAK 'N' SING 1 and the SPEAK 'N' SING 2 are ideally suited for a wide range of industrial, commercial, and entertainment applications such as: security systems, automatic telephone answering and originate devices, as an aid to the handicapped, teaching machines, and much more. Where an unlimited vocabulary is needed, the SPEAK 'N' SING 1 is ideal. When speech of exceptional quality is desired, the SPEAK 'N' SING 2 is perfect.
- Both synthesizers contain an on board FIFO memory buffer to reduce processor overhead and ease software development. None of the other popular bus oriented synthesizers has this feature.
- Each device has an on board audio power amplifier that easily drives an external speaker.
- Both synthesizers may be interrupt driven, however, the on board FIFO should reduce this need in most real time applications.
- A 60 page manual fully discusses speech, music, and sound effect synthesis.
- An 8 bit D/A converter is included on each board for the reproduction of MUSIC and SOUND EFFECTS.
- A single voice music interpreter is also included which allows one to develop MUSIC easily. For example, to synthesize a half note C sharp in the first octave, merely enter C#1H.
- Software is available on 5" or 8" disks in FLEX 2.0 or FLEX 9.0 formats. Included are many utility programs as well as MUSIC, SOUND EFFECTS, and SPEECH games.

SPEAK 'N' SING 1 SPEECH SYNTHESIS

The SPEAK 'N' SING 1 uses a special large scale integrated circuit, the SC-01 by VOTRAX, to reproduce any one of 64 phonemes at 4 inflections. These phonemes allow one to rproduce any word in English as well as many other languages. Typically only 5 or 6 phonemes are needed for each word. Supplied software includes a powerful speech editor with a preprogramed 800+ word vocabulary.

SPEAK 'N' SING 2 SPEECH SYNTHESIS

The SPEAK 'N' SING 2 speech is based on the National Semiconductor DIGITALKER synthesis technique. The high quality of the speech is incredible and must be heard to really be appreciated. Each word is reproduced by storing a single one byte code. The standard word set is listed below and space is provided on the board for additional vocabulary which may be purchased separately.

ONE	FOURTEEN	NINETY	80Hz TONE	DOWN	HIGHER	MARK	PARENTHESIS	SET	A	N
TWO	FIFTEEN	HUNDRED	20MS WAIT	EQUAL	HOUR	METER	PERCENT	SPACE	B	O
THREE	SIXTEEN	THOUSAND	40MS WAIT	ERROR	IN	MILE	PLEASE	SPEED	C	P
FOUR	SEVENTEEN	MILLION	80MS WAIT	FEET	INCHES	MILLI	PLUS	STAR	D	Q
FIVE	EIGHTEEN	ZERO	160MS WAIT	FLOW	IS	MINUS	POINT	START	E	R
SIX	NINETEEN	AGAIN	320MS WAIT	FUEL	IT	MINUTE	POUND	STOP	F	S
SEVEN	TWENTY	AMPERE	CENTI	GALLON	KILO	NEAR	PULSES	THAN	G	T
EIGHT	THIRTY	AND	CHECK	GO	LEFT	NUMBER	RATE	THE	H	U
NINE	FORTY	AT	COMMA	GRAM	LESS	OF	RE	TIME	I	V
TEN	FIFTY	CANCEL	CONTROL	GREAT	LESSER	OFF	READY	TRY	J	W
ELEVEN	SIXTY	CASE	DANGER	GREATER	LIMIT	ON	RIGHT	UP	K	X
TWELVE	SEVENTY	CENT	DEGREE	HAVE	LOW	OUT	SS	VOLT	L	Y
THIRTEEN	EIGHTY	400Hz	DOLLAR	HIGH	LOWER	OVER	SECOND	WEIGHT	M	Z

Write for information on additional word sets.

THE GOOD NEWS

SS-2 SPEAK 'N' SING 2 assembled, tested, manual, disk.	$239.95	SS-1 SPEAK 'N' SING 1 assembled, tested, manual, disk.	$219.95
WD-1 Two additional ROMs with 131 words. ($44.95 when ordered with SS-2)	$49.95	SA-1 As above without SC-01 speech synthesizer chip. (Allows Alford & Assoc. VS-1 owners to upgrade.)	$169.95
SF-21 Additional software (Games, Sound Effects,Music)	$29.95	SF-1 Additional Software (Games, Sound Effects, Music)	$29.95
SF-22 More software (Games, Sound Effects, Music)	$29.95	SF-2 More Software (Games, Sound Effects, Music)	$29.95

FOR THE MUSIC LOVER

This 4 voice Stero Music Compiler easily allows the SPEAK 'N' SING 1, the SPEAK 'N' SING 2, or the NEWTECH Model 68 music synthesizer to reproduce 4 voice music. Written entirely in machine code, it compiles over 50 times faster than BASIC models. The compiler plays four voices simultaneously and allows tempo changes anywhere in the song. It also supports the reproduction of music in stereo. Other features include a 7 octave range, 45 different note durations, built in debugging capability, interface to FLEX files. IF statement for repeating sections and much more. Truely an incredibly powerful MUSIC compiler. ME-1 $39.95

1. BE SURE TO SPECIFY DISK SIZE AND FLEX FORMAT.
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6809 Relocating Recursive Macro Assembler & Loader/Linker with text editor

- Runs on 6809 system (in as little as 32k)
- Interactive or non–interactive (batch) mode
- Supports relocatable and absolute code
- Can assembler 6800 & 6801 source and generate 6809 object
- CROSS ASSEMBLER MODE—can assemble 6800 & 6801 source and generate 6800 & 6801 object
- 8 character global and local labels
- 76 English error messages
- Alphabetized or non–alphabetized symbol table
- Cross reference table
- Checks for unreferenced labels
- Can enable the insertion of a 'SWI' after every instruction
- Supports the following assembler directives:
  ASECT, CSECT, PSECT, DEBUGS, END
  EQU, EXEC, EXT, FCB, FCC, ID, INT
  INCLUDE, NAM, OPT, ORG, PAG, RMB
  SET, SETDP, SPC, TTL, FDB
- Program sectioning (ASECT, CSECT, or PSECT)
- Source of I/O routines supplied
- Total FLEX* compatability
- Powerful co–resident text editor
- TSC source file compatibility

Powerful Macro Capabilities

- 8 character symbolic (substitution) labels
- branch on conditions EQ, NE, LE, LT GT, GE
- supports nesting
- Logical, aritmetic, and string labels
- Sublist processing
- Powerful string functions such as SUBSTRING
- Supports the following directives
  ACNT, AGO, AIF, ANOP, GBLA, GBLB, GBLC
  LCLA, LCLB, LCLC, MACRO, MEND, MNOTE
  SETA, SETB, SETC

Loader/Linker

- Link and load (with offset)
- Link and save
- Global cross references
- Supports the following commands
  LOAD, COMPARE, SAVE, EDIT, LINK, MAP
  INTERNALS, UNDEFINED, CLEAR, RUN
  SECTION, FIX

MASM 6809 ——————————$ 250.00

User's Manual Only (about 200 pages–refundable)– $ 25.00

A version of the above assembler which generates ABSOLUTE code is also available

ASMB 6809 ——————— **$ 150.00**

The above software is available on 5 or 8 inch FLEX* disks, prices include one year maintenance (single CPU). Even if you already own an assembler you should seriously consider ordering these powerful tools.

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Only GIMIX offers you **SOFTWARE SWITCHING** between **MICROWARE's OS-9** and **TSC's FLEX.** Plus you get the power of the GMXBUG system monitor with its advanced debugging utility, and memory manipulation routines. A wide variety of languages and other software is available for these two predominant 6809 Disk Operating Systems.

You can order a system to meet your needs, or select from the 6809 Systems featured below.

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GIMIX' CLASSY CHASSIS™ is a heavyweight aluminum mainframe cabinet with back panel cutouts to conveniently connect your terminals, printers, drives, monitors, etc. A 3 position keyswitch lets you lock out the reset switch. The power supply features a ferro-resonant constant voltage transformer that supplies 8V at 30 amps, +15V at 5 amps, and −15V at 5 amps to insure against problems caused by adverse power input conditions. It supplies power for all the boards in a fully loaded system plus two 5 ¼'' drives (yes! even a Winchester) that can be installed in the cabinet. The Mother board has fifteen 50 pin and eight 30 pin slots to give you the most room for expansion of any SS50 system available. 11 standard baud rates from 75 to 38.4K are provided and the I/O section has its own extended addressing to permit the maximum memory address space to be used. The 2 Mhz 6809 CPU card has both a time of day clock with battery back-up and a 6840 programmable timer. It also contains 1K RAM, 4 PROM/ROM/RAM sockets, and provides for an optional 9511A or 9512 Arithmetic Processor. The RAM boards use high speed, low power STATIC memory that is fully compatible with any DMA technique. STATIC RAM requires no refresh timing, no wait states or clock stretching, and allows fast, reliable operation. The system includes a 2 port RS232 serial interface and cables. All GIMIX boards use gold plated bus connectors and are fully socketed. GIMIX designs, manufactures, and tests in-house its complete line of products. All boards are twice tested, and burned in electrically to insure reliability and freedom from infant mortality of component parts. All systems are assembled and then retested as a system after being configured to your specific order.

56KB 2MHZ 6809 SYSTEMS WITH GMXBUX/FLEX/OS-9 SOFTWARE SELECTABLE

With #58 single density disk controller **$2988.59**
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to substitute Non-volatile CMOS RAM with battery back-up, add 300.00
for 50 Hz export power supply models, add 30.00

Either controller can be used with any combination of 5" and/or 8" drives, up to 4 drives total, have data recovery circuits (data separators), and are designed to fully meet the timing requirements of the controller I.C.s.

5 ¼" DRIVES INSTALLED IN THE ABOVE with all necessary cables

	SINGLE DENSITY		DOUBLE DENSITY		
	Formatted	**Unformatted**	**Formatted**	**Unformatted**	
40 track (48TPI) single sided	199,680	250,000	341,424	500,000	2 for **$700.00**
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Chart shows total capacity in Bytes for 2 drives.

Contact GIMIX for price and availability of 8" floppy disk drives and cabinets; and 5" and 8" Winchester hard disk system.

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for each additional 64KB NMOS STATIC RAM board, add 639.67
for each additional 64KB CMOS STATIC RAM board, add 988.64
for 50 Hz export power supply, add 30.00

***NOTE:** UNIFLEX can not be used with 5" minifloppy drives.*

GIMIX has a wide variety of RAM, ROM, Serial and Parallel I/O, Video, Graphics, and other SS50 bus cards that can be added now or in the future. Phone or write for more complete information and brochure.

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